THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL JULY, 1933

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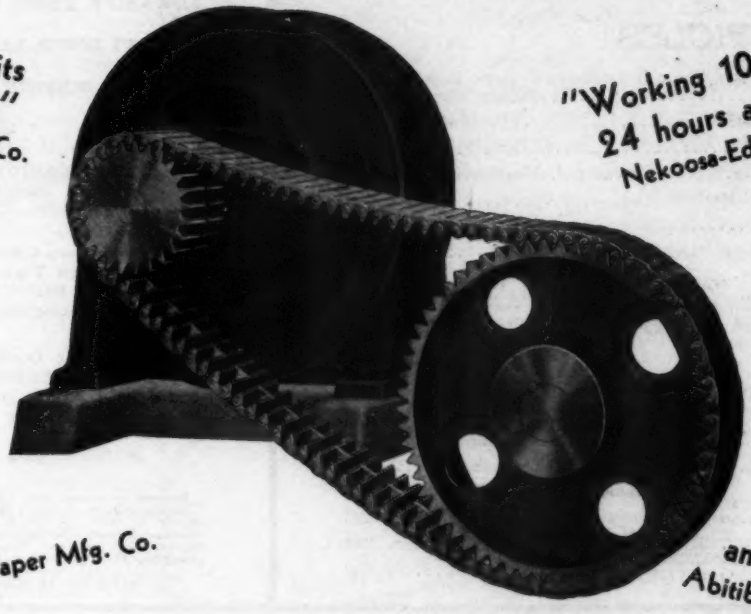

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THE PAPER INDUSTRY

JULY, 1933
Vol. XV—No. 4

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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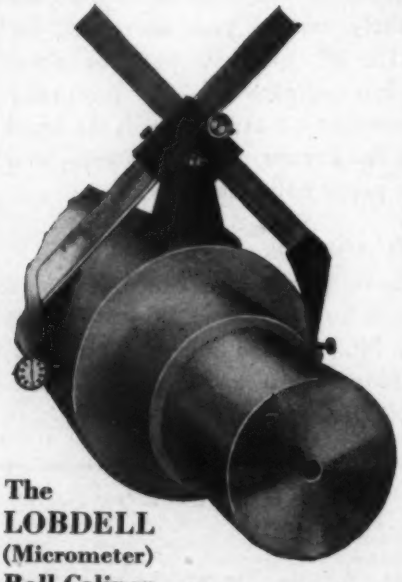

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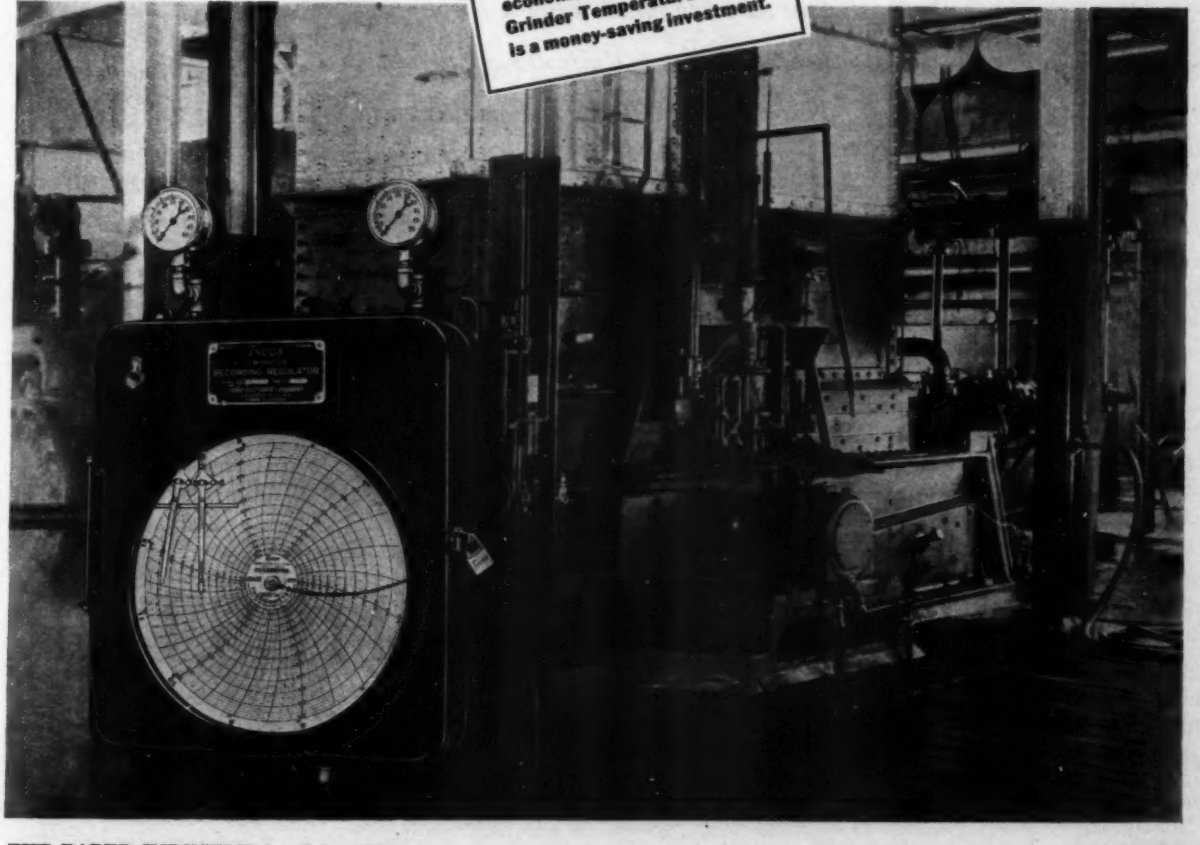

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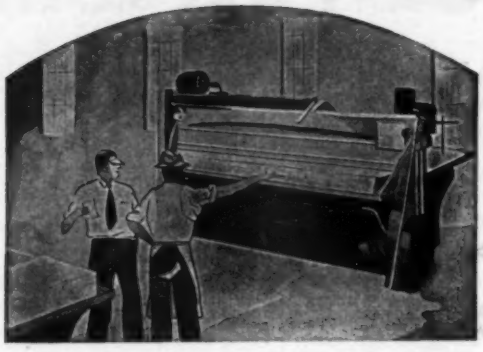

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What Did We Tell You!

THE commodity markets continue upward. If there is a business man in these United States who does not know by this time that the prices of all commodities have appreciated generously and are headed for still further advances, all we have to say to that man is that he is beyond the power of impression.

Of course, the turn in the markets is of an amazing magnitude and is continuing with dead certain celerity. We believe that the buyers and consumers of commodities in this country haven't seen anything yet. We believe that the turn of the markets from the abysmal depths of low-price level to the present time was in great part influenced by the most abnormal exhaustion of stocks of commodities in all reservoirs and in all positions.

The marvelous come-back in demand for commodities, and the ascension of the price level, therefore, is nothing but normal so far. Ahead of us lie those factors of inflation with which the business men of these United States have never had any experience. Those factors of inflation will from now on begin to make their potency manifest and nothing save the strong, guiding dominance of the market by the powers that be will prevent such inflation as this country has never witnessed.

There has been expressed in many quarters the fear that prices will rise too rapidly and caution against further advances in commodity prices has been the counsel of the market leaders. However, we believe that there is an automatic check to excessive production resident in the fact that the raw materials necessary to increase production are practically unobtainable in many lines. This situation can be explained in a sentence.

For four and one-half years, we have had steady, declining price levels and a curtailing demand for products. The curtailment took place first in the consumer buying, which in turn affected the retailer, who, in the absence of the consumer demand, curtailed his purchases accordingly. The wholesaler next in line stopped buying and stocking goods, for neither the wholesaler nor retailer could continue week in and week out, month in and month out and year in and year out to buy goods for future delivery and take the continued inventory losses which the constantly declining price level made inevitable.

Factories and converting plants adjusted their supplies to the consumer and retailer demand and they in turn bought for conversion only what they sold.

These four marketing and distributing factors forced the producers of raw materials to curtail their operations. This situation continued for four and one-half years until all raw material supplies were exhausted. Then, sixty days ago came the augmented demand.

It is impossible to speed up the manufacture and delivery into the market of the vast quantities of commodities needed in that short space of time. Already, we are advised that one of the largest producers of automobiles in the country having the largest number of orders on its books has been obliged to stop all operations from the first of July to the twelfth of July because of inability to obtain the requisite raw materials.

This is the situation that will occur in practically all divisions of industry. Panicky consumers and insistent distributors may offer premiums for existent supplies, but it will not produce one more automobile

nor one more ton of paper, no matter how high the premiums range.

At present, the manufacturing commodity market is wholly dependent upon the supply of raw material. The day is here now when the price of commodities is of secondary importance — service and delivery of the same are the essentials.

The Pulp and Paper Industry Enters a New Era

A NEW industrial era is upon us. The enactment of the National Industrial Recovery Act and the appointment of General Hugh S. Johnson to administer it has brought it about.

What may be accomplished through the enforcement of this new law is yet too early to prognosticate. What its effects will be upon the lives of American people and American business can hardly be prophesied. There cannot, however, help but be a change from the old way of doing things.

This law demands co-operation—not only between labor and capital, but co-operation among the forces of capital itself. Not within recent years has there been much dissension within the pulp and paper industry between labor and capital, but who can deny there has been unwarranted overexpansion in the industry and that the industry's price wars have become common gossip. Now, an opportunity for more complete harmony in the ranks of papermakers may be brought about by foisting upon us the National Industrial Recovery Act.

True, there will be opponents to the Act who may make every effort to prevent it from being successful. Also, there may be parts of the plan yet untried that will not work out in practice. Nevertheless, in principle, its primary purpose is to increase employment and to raise wages, and through raises in wages and through increase in employment to give more purchasing power to the masses — in the long run the group upon which every business depends for its very existence.

Already wheels of organization within the paper industry for the purpose of contacting governmental agencies in regard to matters pertaining to the Act have been put in motion. On June 2, 1933, at a meeting of representatives of various paper manufacturing group organizations, S. L. Willson, president of the American Paper and Pulp Association, was elected as chief representative of the paper, pulp and allied industries, to make these contacts.

Following his appointment, Mr. Willson immediately asked each individual manufacturer of pulp and paper in the United States to ally himself with his proper trade group organization. Meetings of the various group organizations, several of which have been reorganized or created since the enactment of the National Industrial Recovery Act, have been held, and now a preliminary draft of a General Code of Fair Competition for the industry has been formulated. This code, dividing the country into three zones—southern, central and northern—is published elsewhere in this issue. Become familiar with the details of the code and co-operate as fully as possible with the central agency for the industry so that the paper industry as a unit may be permitted to function most efficiently with the Federal Government in operating under the National Industrial Recovery Act.

Getting Work Done

JUST as the division of responsibility and delegation of duties in the army makes for efficiency, so does the efficient functioning of the working force in any business require that the employees work with those in authority. Naturally, the responsibility of the success of the individual business rests upon those in authority and to them is delegated the task of directing the efforts of the entire working force.

In order to get things done, orders must be given by those in authority to subordinates. Such communications transmitted either verbally or by the written word may consist of definite direction or might be only suggestive. In some instances, they might even consist of both suggestions and directions.

Verbal orders are more human than written and may have the added advantages of speed and convenience together with clearness. Their chief disadvantage is the lack of permanent or even temporary records that the orders were ever given. On the other hand, written orders avoid confusion and may serve as records for either permanent or temporary use. They may also serve as constant reminders and signify a greater degree of importance to the recipient. In addition, they may be rechecked, may be more convenient, or even more accurate than similar communications expressed verbally.

In either case, care should be exercised to make them clear. There should be no opportunity for misinterpretation. Such clarity particularly with written orders, eliminates the possibility of "buck-passing" and expedites the handling of every detail of business from the lowest ranking executive to the highest.

◆ PAPER MAKERS are said to have been exempt from service in Washington's army.

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Let's Stay at Home!

By WILLIAM SIBLEY

THE New Deal is on. So many deep-going changes have been instituted during the past three months; so much history has been made, that it is all a bit confusing. The New Deal is on, and the future is obscure because the old rules no longer apply. The very foundation stones upon which famed American enterprise has been builded have been removed. Such basic things as free competition, unlimited production by one unit regardless of the status of other similar units or individual and unhampered determination of wages or hours are gone—and probably for a long time. A year ago, in the heat of the presidential campaign, President Hoover said that if elected to office the Democrats would effect changes which would extend to the second and third generation. Whether or not, at that time we sneered, he was right. Whether we like it or not, drastic governmental controls are going to be attempted. Industry can no longer control itself. Fortunately, the Roosevelt brand of collectivism does not close the door of partnership to industry (as does the Russian brand), but American industry has lost, definitely and completely, its opportunity for self-discipline or the creation of its own sanctions. The Securities Bill closes the door of freedom for the investment banker; the Industrial Recovery Bill nullifies the old type of freedom for the manufacturer; the Agricultural Adjustment Administration is going to attempt similar assumption of freedom from the farmer.

Control, in itself, is not altogether objectionable. Whether the contemplated controls will work is a matter of conjecture since only time will reveal the consequences. Some people say it surely will be of great benefit. Others say that controlling measures have hampered instead of helped the railroads, and so cannot be made to work. But regardless of personal opinion as to the value of governmental control, it is here. And here for the purpose of accelerating the end of the depression in this country.

Now, the New Deal is over in London, attempting similar adjustments to the end that world-wide depression may be stopped and world-wide prosperity regained. At the time this is written, the Conference is reported near an impasse over the question of stabilization—the prime objective of all European powers. The objective of international stabilization is, of course, quite desirable. But money stabilization depends upon other types of economic stability, notably earning and purchasing power of the masses, and so in my opinion is a problem individual to each nation. Probably France and the United States could stabilize their currencies without material harm, but England, and certainly the rest of the world, could not, without first bringing their industrial and agricultural conditions to normal. Let each nation do the first job first; each nation fix its own monetary stability; the which would be the greatest assurance of ultimate international success.

The world-wide strengthening of price levels is the second purpose of the London Economic Conference. We have merely to turn to the history of the attempts to control the prices of sugar, rubber or coffee, and we can see the ultimate breakdown of any attempted international cartel. We will see that if the London Conference can raise prices by international action it will accomplish a miracle.

Commodity price control is almost entirely a matter of national action—up to the present time, never a matter for international action. Being predicated entirely upon national policies, price range becomes a matter of product protection. And that means tariff—the universal, world-wide lowering of which is the third objective of the Conference.

With so many new governmental controls established for the rehabilitation of domestic industry, the lowering of our tariff walls is wholly inconsistent with the Government's domestic policies. To subscribe to any international plan for the further reduction of those barriers would be to make our Government's action grossly ineffective. Higher, not lower, tariff walls are what we need to protect 96 per cent of American business. The ancient fishing industry off the coast of New England is today almost out of business because Japan can wholesale fish in the New England markets cheaper than the same fish can be caught in New England waters.

As a matter of fact, the prime reason we are now in London is to do what we can to help rehabilitate international business. Why we should go to such pains to effect a betterment in something that constitutes only four per cent of our total American trade is a bit beyond me. True, our export trade involves some three million men, 50 per cent of our cotton trade, 18 per cent of wheat, 10 per cent of corn and 40 per cent of our tobacco trade. But, by the same token, our world-wide depression has been caused through the overproduction of raw materials (not manufactured commodities), and since no country can long import manufactured goods without exporting raw materials—anything which will promote raw-material trade abroad is merely a further aggravation of the conditions which gave rise to our present troubles.

Our problems are primarily domestic. There is no sense in shutting our eyes to the fact that the only way we can increase our exports of raw materials is by increasing our imports of manufactured goods. And that cannot be if we are to effect a return to domestic prosperity. We have plenty of work to do right here within our own borders. Our own domestic job is such that it taxes the available leadership. If the London Conference fails, let's applaud.

LET'S STAY AT HOME!

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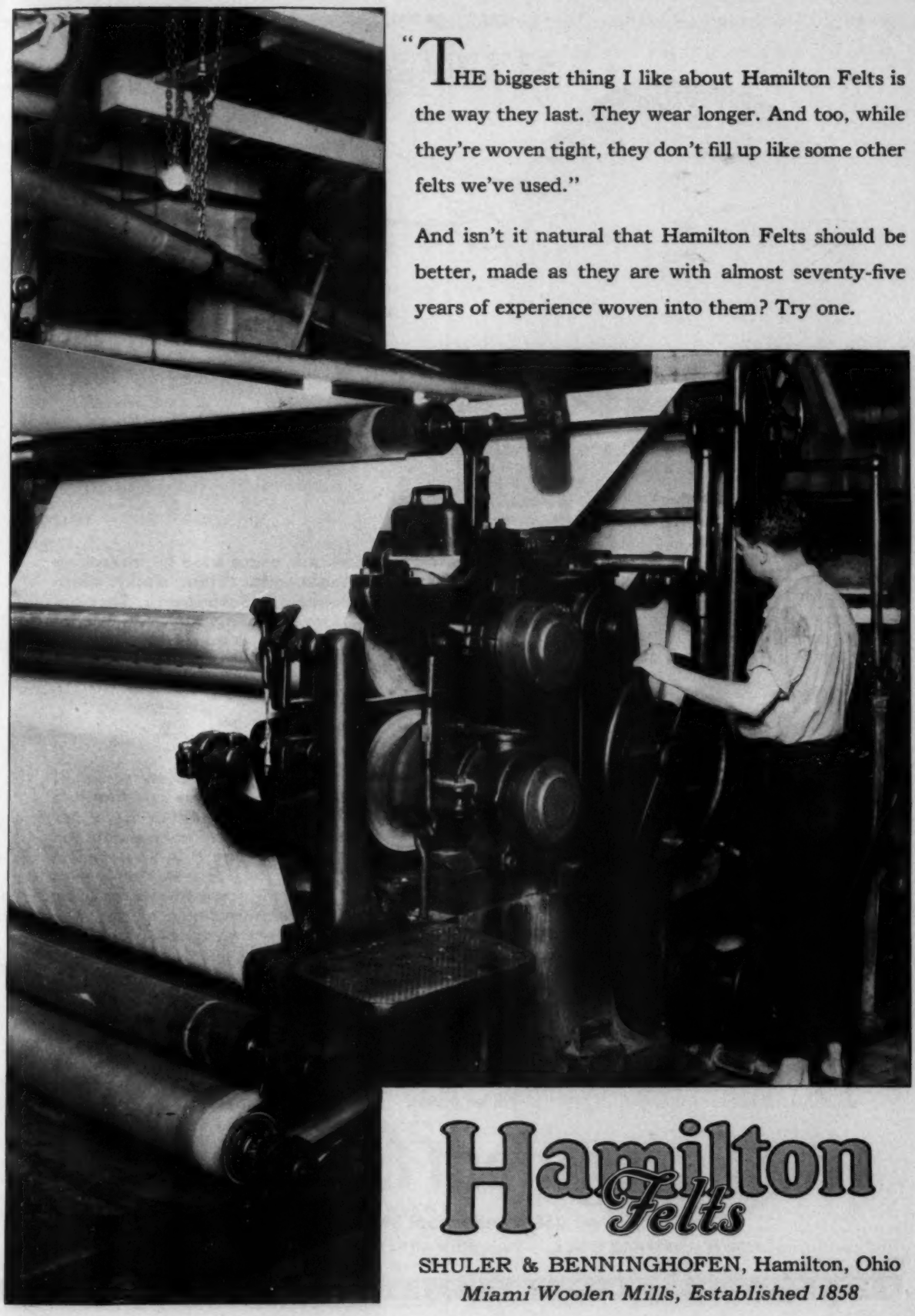

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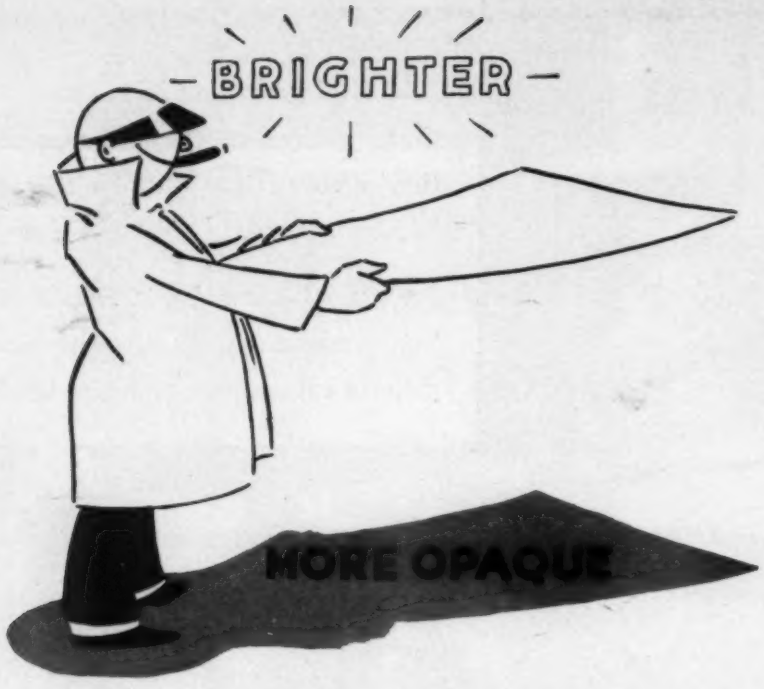

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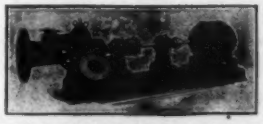

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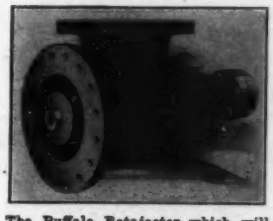

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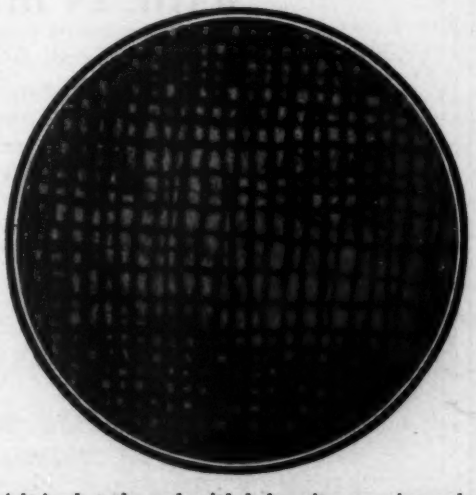

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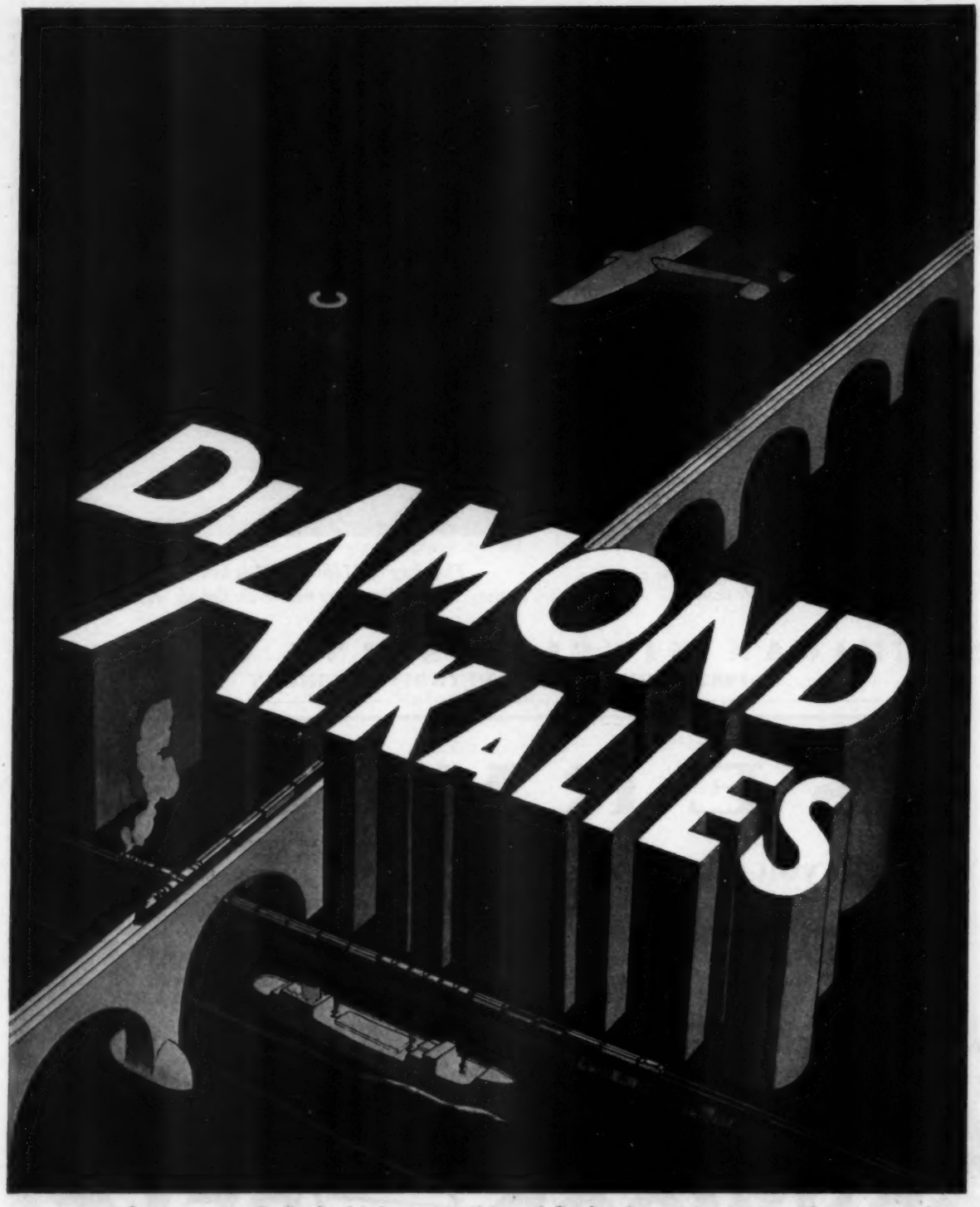

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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

"For every evil under the sun There is a remedy or there is none."

By SIDNEY FROHMAN, President
The Hinde & Dauch Paper Co.

EVIDENTLY there was a remedy for the industrial dearth of the long depression period—and the present administration has found it.

There are those who still deplore the application of that remedy, believing that the time-honored gold standard with its fictitious dollar valuation should have been maintained at whatever cost, until the end of time. There are others who, seizing avidly upon the benefits conferred by the cheaper dollar and joining enthusiastically in the new march toward prosperity, tremble at the thought of dictatorship suggested by the elaborate activities of the Washington Government.

To understand the situation and to harmonize the industrial trend of the Federal Government with American ideals and constitutional guaranties, one must first recognize the existence of an emergency no less acute than that produced by the exigencies of war. Millions of Americans are subsisting on charity. Other millions, with shortened incomes are striving to keep the wolf from the door, and still others are oppressed by debt to the point of exhaustion. Such manifestations occurring in war time would be deemed sufficient warrant for the commandeering of all industry.

With this realization, the projected activities of the administration, in connection with industry and labor during the period of recovery are quite understandable. True, with dollars seeking their normal level of purchasing power, a heavy extra burden of debt service has been lifted from industry, agriculture and every division of human effort. True, the response has been prompt and most encouraging. It is also true that, left to itself, the natural operation of the immutable law of supply and demand, would eventually effect a just distribution of benefits, for although "the mills of God grind slowly," they do indeed "grind exceeding small." However, the temper of a people groaning under present emergent conditions could not abide the slow operation of natural laws to rectify an evil caused by an overvaluation by the Government of its own legal tender. Consequently, the administration is confronted with a most complex problem. While paving the way for a return to a normally remunerative commodity price level, it must protect the worker temporarily against the inevitably consequent increase in cost of living, until a natural balance is struck between profits and wages.

Under the stress imposed by the cumulative effect of a financial crash followed by three long years of all too successful deflationary effort, the President and his supporters are to be congratulated upon the moderation with which he seeks to wield the extraordinary powers temporarily vested in him. The more heartily the producing classes co-operate in the working out of his announced plans, the sooner may we expect the present emergency to pass.

"We, the people of the United States." These seven words which introduce our national organic law, have become greatly confused in their application to twentieth century conditions. Group solidarity has read into them the effective meaning of "We, the organized minorities of the United States." However much we may deplore this subversion, it is but a logical and inevitable development of the age-old

principle that "In union there is strength." Within the elapsed third of the current century, the strength of organized minorities has been amply demonstrated in our legislative halls and elsewhere. It is this great strength which the "Recovery Act" seeks to hold in check with the greater strength of national administrative regulation. Because of an immense surplus of potential labor, the newly rehabilitated employing class is temporarily invested with extraordinary powers which the government proposes to hold in check by regulation and the swift absorption of the labor surplus.

Individual initiative plus our great wealth of natural resources has made this country great. If that potent force were to be suppressed by governmental regulation, then indeed, we might tremble at the prospect, for in proportion to its repression at home, it would be fostered abroad to our sorrow.

But the co-operative attitude of the regulatory authority from the President down, is calculated to encourage individual efficiency and originality, with special favors to none and with fairness to all who are themselves willing to play fair. This to the end that all may come into prosperity together.

Research by British Chemists

in the Field of Cellulose and Papermaking

By LOUIS E. WISE, Professor Emeritus
New York State College of Forestry

AT FIRST BLUSH, the contributions of British chemists to the art of papermaking during the past two and a half years may seem somewhat disappointing. Superficial judgments, however, must be suspended. England imports most of her chemical wood pulp. In fact, the island supports only two sulphite mills.[1] Hence, we would hardly expect elaborate studies on the mechanism of chemical pulp, but rather articles on papermaking, the analysis of raw materials, and of the finished products.

Then, it is also well to bear in mind that the colonial possessions of the Empire maintain independent research institutions on papermaking. India has her elaborate Forest Research Institute at Dehra Dun. Canada boasts a new and magnificent Pulp and Paper Research Institute at McGill University, in Montreal. The Council for Scientific and Industrial Research (Division of Forest Products) functions in Melbourne, and examines the pulping qualities of Australian woods. New Zealand has her own state forest service. South Africa maintains a Forest Products Institute (a miniature of our own Forest Products Laboratory).

It is only with this clear understanding in mind, that we can fairly compare the work of British paper chemists with that of the scientists in other nations, especially, since this brief resumé makes no pretense of recording the manifold publications from the far flung colonies of the British Empire.

It is also well to remember that in Great Britain, for several decades past, the trend of thought dealing with the more fundamental aspects of cellulose chemistry, and of the chemistry of papermaking, emanated from the laboratories of those technological giants, Cross and Bevan. To these chemists must be ascribed not only the beginnings of the present day rayon and Cellophane industries (in which they were the basic inventors), but also a number of important methods used in the paper industry in the evaluation of its chief raw materials. They were arbiters of the British Cellulose industry.

Cross and Bevan are mentioned, since a number of prolific cellulose chemists now publishing in England, were trained in the fine tradition of Cross and Bevan. While the data of later investigators have shown definitely that some of the theories of Cross and Bevan on the constitution of cellulose and lignin are no longer tenable, the colossal industrial accomplishments of the great English chemists should not be obscured or minimized. Their influence still makes itself felt in various branches of industry dealing with cellulose.

One of the associates of Cross and Bevan was Charles Dorée. Some years ago, the author had the pleasure of meeting him in London, at the Chelsea Polytechnic, where he was carrying out some interesting work on lignin. Dr. Dorée has recently written an important book on *The Methods of Cellulose Chemistry* (499 pp., D. Van Nostrand, New York, 1933 and Chapman & Hall, London, 1933). The volume, which encompasses the field of normal cellulose and its synthetic derivatives, as well as the so-called compound celluloses, has been favorably reviewed in the U. S. A. Despite its high value, it still contains terms like *hydro* and *oxycellulose,* which are rapidly disappearing in America.

The analyses of raw materials used in the paper industry, and testing of the finished product have been collected from time to time by an anonymous writer (or writers) who adopts (or adopt) the pseudonym *The Paper Mill Chemist.* Let us refer to a few of these collected methods. Under the analysis of rosin, are[2] discussed the melting point, density, saponification number, acid number, and unsaponifiable portions. Casein also[3] receives attention. Under starch,[4] the analysis of different starches used in papermaking are discussed. Another author, Govier,[5] had previously discussed the modified forms of starch which enter the beater and their effect on the properties of the finished sheet. He compares the starch esters used in tub-sizing with casein.

The Paper Mill Chemist also discusses[6] wood pulp as a raw material. Mechanical pulp is examined for

color, cleanliness, degree of grinding, ash, solubility and rosin. Chemical pulp is tested for fiber-length, cleanliness, color, strength, hardness, ease of bleaching, degree of bleaching, ash, rosin and per cent cellulose.

Dyestuffs and pigments also receive attention. *The Paper Mill Chemists*[7] gives tests for individual colors, and includes ash, moisture, acid and alkali resistance, size of particle, covering power, retention, fastness to light, resistance to heat, etc. Under the examination of China clay, he includes water, *combined water*,[8] color, iron, coloring matter, grit, particle-size and plasticity.

In the examination of the finished sheet, sulphur, arsenic, iron and copper[9] impurities in paper are tested for, as are other residues resulting from digestion, bleaching and sizing operations. Methods for the systematic[10] examination and classification of specks in paper[11] are also outlined. Strachan, one of the most prolific, critical writers in the field of pulp and papermaking, has discussed dendritic (tree-like) growths in paper.[12]

The powerful "Buy British" campaign has served to bring to the fore in the technical journals a number of instruments made in England. The *blancometer*[13] which employs the principle of the photo-electric cell (British Patent Spec. 324,351) is used in the specification of nearly white colors. The *Cambridge opacity meter and electrometric pH apparatus*, and an English made *comparator* for colorimetric H-ion measurements have also received the attention of an anonymous writer.[14]

The mention of a comparator brings us naturally to discussion of acidity in paper by Edge,[15] who emphasizes the complexity of the problem, and the fact that a perfectly satisfactory method of evaluation remains to be devised. However, Edge states, there are two reasonably reliable methods for investigating acidity. One involves the electrometric titration of a definite weight of paper, in contact with a definite volume of water. The other involves the use of solution of known hydrogen-ion concentration. The solution, the pH of which remains unaltered when the paper under investigation is immersed in it, indicates the pH of the paper itself.

The determination of groundwood pulp in Indian newsprint has been studied by Dunnicliff and Suri[16] and also by Fox.[17] The former showed that the Cross and Bevan's phloroglucinol method had to be substantially modified, a conclusion reached after a thorough study of the effects of time, temperature, volume of reagent, weight of sample, etc. Their final modification satisfactorily serves local conditions.

Strachan, to whom reference has already been made, has discussed critically the theory of bleaching.[18] According to Strachan, there are three stages in the bleaching of sulphite pulp. Oxidation is only one of the effects. Strachan suggests careful control of acidity, Cl-concentration, and temperature and thorough washing. He discourages the use of antichlors. In other papers, the same author discusses the durability of paper,[19] improvements in the design of pulp-drying ovens; errors[20] in testing the air-dry content of wood pulp. He has also compared the[21] action of the beater with that of rodmill and the refiner.[22]

Laboratory studies on heating bleached and unbleached bamboo pulp were made by H. A. Harrison,[23] who points out the differences of bamboo and wood pulps in the beater. This same authority[24] has compared the beating of wood pulp in the laboratory and in the mill. The uses of the Lampen Mill and the British sheet machine are described as furthering the solution of various problems. The effect of ageing and the degree of cooking on the strength of the pulp are discussed. The effects of beating and of heat (on dry pulp) are also presented.

A very important series of papers by Dr. Harrison dealing with factors affecting the water resistance of paper deserve special mention.[25] Studies were made both on laboratory and on mill made papers, which had the same degree of water resistance, and which also had the same finish and similar characteristics. Harrison points out the importance of controlling relative humidity during the conditioning of test sheets, and other factors which must be kept in hand. He determined the optimum concentration and contact periods of size and of alum. He showed the marked influence of temperature on sizing, the relative unimportance of pulp consistency on sizing in the laboratory. He (as others have done before him) demonstrated the importance of hydrogen-ion concentration. He showed that, in general, the addition of organic dyestuffs does not influence sizing, but that the excessive use of pigments may be deterimental. The use of rosin powder (made from mill size, by precipitation with alum) is favorably discussed. Harrison also describes the outstanding sizing properties of formaldehyde-acenaphthene resin. In point of fact Dr. Harrison's report is really a brief monograph, any abstract of which must be inadequate.

A general symposium on rosin sizing was ushered in by a leading paper by Dr. Harrison covering,[26] step by step, the leading factors which have a direct or indirect bearing on the sizing of the finished sheet.

Boyle[27] has presented data on the relationship between thickness of high-grade engine and tub-sized writing paper and their tensile, bursting, tearing, and folding strengths.

Croswell, Treshfield and Heller[28] have recently pointed to the dierepancies between rosin retention in hand sheets and mill made paper. Apparently the former retains far less size, the largest loss occurring during the dilution of the stock in the sheet molds.

Ultra-violet light on a gelatin in paper, served in a recent study by H. A. Bromley,[29] who irradiated a high grade of tub-sized paper by means of a mercury vapor lamp. Darkening and degradation (due to the decomposition of gelatin) resulted.

The relationship between bursting strength and tensile strength of paper sheets has been studied by Roberts.[30] An oblong opening replaces the usual circular opening on the Mullen tester, which then serves in determining the tensile strength of newsprint.

A rapid method for laboratory sheet-making and testing[31] was devised by Cottrall, Prior and Baker, who modified the Paper-Maker's Association methods. They replaced the previously used free-air drying, by drying the sheets at 60 deg. C., under tension between felts in a special drier. Thus the drying operation

takes fifteen minutes. Thereupon the sheet is allowed to reach a definite water content, in a room kept at constant humidity. This conditioning process takes fifteen minutes. The strength tests, shrinkage data, etc., are furnished by the authors.

Cottrall[32] has made a critical study of the tearing resistance of paper, dwelling especially on the differences between the ballistic and static methods. He describes a new static tearing tester (which gives results about 20 per cent higher than those of ballistic instruments like that of Elmendorf). In the opinion of the author, the tearing test serves in controlling the papermaking operation, but has little value in indicating the actual performance of paper when in use.

In an article on the "volumetric composition of paper," Potts[33] takes up the permeability of paper to air. Measurements of this type give clues to the effect of papermaking operations on the finished sheet, and serve as a control on such operations. For example, in papers used in electrical work, permeability is correlated with dielectric strength. Potts has explained his methods for permeability measurements and presents tabulated data.

For anyone interested in a comparison of American and British pulp testing methods, an article by H. W. Layman[34] should be enlightening. The Papermaker's Association of Great Britain supplied a complete set of its standard equipment to The Mead Corporation, which then used the two sets of procedures. British methods are relatively slow, but highly accurate. The American methods are faster, well suited to routine connected with actual production, and less precise. This gives a contrasting picture between the viewpoints of the sister nations. Arup[35] has examined vegetable parchments suitable for packing dairy products, and has suggested the following tentative specifications: moisture (maximum) 10 per cent; water-soluble extractive 1.3 per cent; ash 0.45 per cent; bursting strength (Ashcroft) a minimum of 25 lb. per sq. inch for parchments of 25 lb. per ream. If extractives are too high, future mold growth is indicated.

Miscellaneous work bearing on the paper industry includes an article by MacGregor,[36] who is a strong protagonist for the Rinman process,[37] in which powdered BaO is mixed with CaO, and added to concentrated waste liquor, containing the non-cellulosic components of esparto grass. The mixture on subsequent destructive distillation apparently yields alcohols, ketones, and hydrogen, apart from the recovery of soda.

A patented apparatus for overcoming foam and scale formation and the escape of volatiles in the concentration of waste sulphite liquor is described by Miller.[38] In his description of the evaporators, the author includes the capacity and the power, steam and cooling water requirements.

Finally we must not fail to mention several recent articles dealing with certain fundamentals. O'Dwyer[39] has summarized recent work on the hemicelluloses of wood, and has shown their possible relationship to lignin. In a series of three papers, David Bell[40] has given the results of a comparative study of the methylated products derived from cotton and from the alpha-cellulose derived form Sitka spruce, from two types of oak, and from common beech, and also from a commercial pulp. The work is entirely too detailed for adequate discussion. Suffice it to say that according to the author's findings there are marked chemical differences between cotton and wood cellulose.

Haworth, the outstanding English investigator in the field of cellulose chemistry, has again busied himself with the molecular magnitude of cellulose,[41] which is pictured as a chain having a molecular weight ranging from 20,000 to 40,000. His new experimental data are in surprisingly good agreement with those previously submitted by Haworth and also by other investigators. On mild hydrolysis 200 grams of completely methylated cellulose yielded only 1.1 gram of tetramethyl glucose. The remainder was 2, 3, 6-trimethyl glucose. This ratio indicates that the molecule has a chainlike structure, since only the free groups, at the extreme ends of a long cellulose molecule could account for the formation of tetramethyl glucose.

This summarizes very briefly the researches having a direct or indirect bearing on the pulp and paper industry, carried out by British investigators.

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Why Fly a Signal of Distress?

I do not prize the word "cheap." It is not a word of cheer. It is not a word of inspiration. It is the badge of poverty, the signal of distress. Cheap merchandise means cheap men and cheap men a cheap country.—*William McKinley.*

PUMPS and PUMPING

Recommendations for Paper and Pulp Mills

By WILLIAM P. GARGAN
Assistant Chief Engineer, Goulds Pumps, Inc.

OF the many industrial, chemical or process plants where the product is prepared mainly in the liquid state, few require a greater quantity of liquid to be pumped, or a greater number and variety of pumps, than the pulp and paper mill.

While the pumps may comprise only a small part and relatively a slight investment in relation to the other and more expensive equipment of a paper mill, the need of reliable, suitable and efficient pumping apparatus is just as important as any of the other equipment used, because in many places the failure of a pump will shut down the paper machine and cause considerable reduction of tonnage with its resultant loss in time and money. In addition to this need of reliability, the efficiency of the pump has a direct bearing upon the ultimate cost of production of paper because of the large amount of power required for driving the various pumps.

By proper selection of pumps of high efficiency, installing them properly, and using the proper size of piping and fittings to reduce friction losses to a minimum, a distinct saving in power requirements for pumping can be made. This is reflected in lower production cost or higher profits on the product.

The determining factors in selecting the type of pump best suited for the conditions of operation are the nature of the liquid to be handled, whether thin or thick, abrasive or non-abrasive; if viscous or volatile, the temperature, the volume and pressure required; if stock, the kind and consistency; whether for continuous or intermittent service, the type of drive, and whether control is to be manual or automatic.

Types of Pumps

Pumps may be roughly divided into three distinct types: reciprocating, centrifugal and rotary. Any of the three types can be used for the transfer of most liquids, but each has its own field of use to which it is best suited, and each has certain limitations and services for which its use is not advisable.

Before attempting to select or specify a certain type of pump for some particular service, it is well to have some knowledge of the various types, their principle of operation, their adaptability to the service, the reasons for their limitations of use, and their suitability for the various types of available drive.

Reciprocating Pumps

The reciprocating pump, which is the earliest type, may be termed a positive displacement pump. It consists of one or more cylinders with pistons or plungers, and valves so arranged that a definite amount of water equal to the piston or plunger displacement (less some slip) is alternately drawn into, and forced out with each stroke of the piston. Flow of the liquid is intermittent, and the velocities and pressures are variable through the stroke. For that reason, some types are built with several cylinders, and all are provided with air chambers to smooth out the pulsating flow.

Reciprocating pumps may be classified as single-acting, in which the water is taken in during one stroke and discharged on the return stroke; or double-acting, in which water is taken in and discharged during the same stroke.

Further classification may be made with reference to the number of cylinders used, as: simplex, duplex, triplex, etc. They are also referred to as vertical triplex, etc., when the cylinders are placed vertically. Drive may be by means of belt, or motor through gearing, or the units may be direct connected to steam cylinders, as in the case of the well-known steam pump.

Reciprocating pumps are well suited for service requiring small or large capacities, high pressures, and sustained high efficiency; for installations where intermittent but absolutely reliable automatic operation is essential, and especially where pump works under a high suction lift; for services such as feeding small boilers, hydraulic rams, presses or accumulators, small water supply systems, wet vacuum, etc.; and for services where a constant quantity is required against a variable discharge pressure.

They are not suitable for direct connection to high speed driving units. Belts, gears, etc., must be used between the driver and the pump. Some of the smaller sizes, however, are built up with gearing so that driving motors may be mounted with pump, and connected through belts on short centers, making a compact unit. Neither are they well suited where quietness of operation is essential; where available floor space is limited; or for handling liquids containing large solids. Likewise, the first cost is high, especially in pumps of large capacity.

A *by-pass,* unloading device, or relief valve is required where there is likely to be any closing or throttling of discharge (such as filters, presses or boiler feeding). Otherwise, driving motors would have to have a high starting torque.

Centrifugal Pumps

The centrifugal pump is of very simple construction, consisting mainly of two major parts, a fixed casing with bearings, stuffing box and connections for suction and discharge piping, and a rotating element consisting of a driving shaft to which is secured one or more impellers.

Its simple construction, absence of valves, non-pulsating flow, comparatively small size, quietness of operation, and its adaptability to direct connection to high speed electric motors and steam turbines, all com-

bine to make this type of pump particularly well adapted to most pumping services.

Standard designs are now obtainable in capacities up to 20,000 g.p.m. and pressures up to 1200 lb. per square inch. Through persistent research and experimental work, efficiencies of centrifugal pumps have been constantly improved, until they now approach, and in many cases in the larger sizes, equal that of the reciprocating pump.

Centrifugal pumps may be divided into two general classes: Single-stage (having one impeller) for low and medium heads, and multi-stage (having two or more impellers) for high heads.

Single-stage pumps are built in single suction—i. e., where liquid enters only one side of the impeller; or double suction type, where liquid enters both sides of the impeller. The impellers may be the open vane type, or with the vanes enclosed by side shrouds.

Multi-stage pumps are usually built with single suction enclosed impellers.

Horizontal types of pumps are most commonly used, although the vertical type has many applications, such as for sump, well, and like services.

The centrifugal pump has many advantages, among which are: Quietness in operation; suitability for direct connection to high speed motors and steam turbines; small floor space requirements; small size and light weight; low first cost; no valves and can handle liquids containing foreign matter and solids; non-pulsating flow, making the service easier on both piping and driver; lower cost motors can be used for driving, because of high speed and light starting duty; well adapted to automatic control; no relief valve or unloading device required, and no damage to pump or motor can occur even should discharge valve be closed for a short time.

Centrifugal pumps are not well suited for quantities under 100 g.p.m. against high pressure, or for conditions where constant quantity or delivery is required against a variable pressure at a constant speed.

Except for some few special designs in the smaller sizes, they must be first primed before starting, or installed under a positive suction head to avoid priming.

Rotary Pumps

Rotary pumps, like the reciprocating type, are positive displacement pumps. Intermeshing gears, or cams with very close clearances, rotate in a close clearance case. The separation of the teeth of the cams, or gears, creates a vacuum drawing liquid in through the suction pipe, and carrying it around through the case, when the in-meshing of the gears displaces the liquid, forcing it out the discharge opening. Operating speeds, however, are higher than reciprocating pumps, and the discharge is much smoother.

These pumps are well suited for handling viscous liquids like oils of all kinds, heavy syrups, thick liquors, such as soaps, cutting compounds, paints, varnishes, etc. It should be borne in mind, however, that only liquids which have some lubricating qualities and free from grit or abrasives should be handled by them. Grit will cause excessive wear, destroying the close running clearances, and soon destroy the usefulness of such a pump. Solids or fibrous material may jam between the cams and case, causing damage to the pump, or to the driving unit because of excess power consumption.

Rotary pumps are small in size and light in weight. They are of simple construction, being made up of but few parts, and are usually self-priming if suction lift is low.

PUMPS COMMONLY USED IN PULP AND PAPER MILLS

The pump requirements vary considerably in nearly every pulp and paper mill, both as to capacity and pressures, and also in the general pumping services throughout the plant. The following tabulation covers some of the most commonly used pumps for average service, and includes types and constructions.

General Mill Supply (Raw Water)

Centrifugal pumps, usually of the horizontal type.

Single-stage, double suction, with bronze impeller, if the total head is less than 200 feet.

Multi-stage centrifugal may have to be used for higher heads than 200 feet.

Single-stage type usually from filters, or settling tanks to mill supply.

Power House

Boiler Feeding—For small boilers up to 800 or 1,000 b. hp. 100 lb. pressure or more, use reciprocating pumps, fitted with by-pass and relief valve. Small triplex is usually best type. Construction should be bronze fitted.

Reciprocating steam pumps are also used to advantage in feeding smaller boilers, as the speed of pump can be adjusted to the load, and the exhaust can be put to various uses such as heating or process work.

For larger boiler installations, use centrifugal pumps, usually of the multi-stage type, bronze impellers and bronze covered shaft.

Reciprocating pumps should operate at moderate speeds, and fitted with bronze lined cylinders, if of the piston type.

Centrifugal pumps should be motor driven, or steam turbine driven if the exhaust can be utilized in heating or process work.

The capacity of any boiler feed pump should be ample for the peak load requirements of the boiler, and pressures at the pump should be at least 20 lbs. higher than the maximum boiler pressure.

Boiler feed pumps should be set so that suction is under a submerged head of from 10 to 15 feet over and above the pressure of evaporation, which, of course, is determined by the temperature of the feed water. This is to prevent vaporization of the hot water, with its resultant vapor bnding of the pump, and to avoid the possibility of intermittent discharge.

Condenser Service—Cooling Water Pumps for Barometric, Jet, or Surface Condensers.

Use centrifugal pumps, usually of single stage, single or double suction type, with bronze impeller and bronze covered shaft.

The centrifugal pump for barometric condensers should be selected with a shut-off or no delivery head somewhat greater than the actual static elevation up to the condenser. After vacuum is established, the total head at which the pump operates will be reduced

by approximately the amount of the vacuum established.

For Circulating Condenser Cooling Water to Spray Ponds or Cooling Towers, use centrifugal pump—single stage, double suction, with bronze impeller and bronze covered shaft.

Wet Vacuum Pump—Rotary type vacuum pump, or reciprocating, double-acting piston pump, single or duplex, with submerged valves so as to avoid usual priming are very largely used.

Sump Service—Use centrifugal pumps, vertical submerged type, with open type impeller of bronze. Impeller should have large openings to pass possible solids or foreign matter. Motor should set well above pit cover, with ball thrust bearing and lower bearing lubrication facilities accessible above the pit cover.

If for intermittent, automatic operation, they should be equipped with float and float switch, so as to start and stop pump at predetermined levels.

Fire Protection

Use multi-stage centrifugal pump, bronze impeller and bronze covered shaft for high pressure lines. These pumps should be approved by the Underwriters' Laboratories, Associated Factory Mutual or other Fire Protection Bureaus having jurisdiction. Approved fire pumps are available in capacities of 500, 750, 1,000 or 1,500 g. p. m., for standard pressures of 100 lb. Some mills where the hazard is greater than usual, or where very high wood piles are near to the buildings, may require even higher pressures. For such mills, approved fire pumps are available at pressures up to 300 lb. Approved pumps are usually motor driven, and furnished complete with fittings and valves for connection to fire lines, or hose lines.

For tank supply for sprinkling systems use centrifugal pump, single-stage, double suction with bronze impeller and bronze covered shaft.

Ground Wood Mill

Grinder Pressure Pump—Centrifugal double suction type with enclosed impeller. Regular or bronze fitted. Reciprocating pump may be used. With the reciprocating type, a pressure tank should be installed between the pump and grinders, or else pump should be fitted with pressure relief valve.

White Water Pump to Grinders—Use centrifugal, with double suction enclosed impeller.

Screened Ground Wood—For finely screened stock, use centrifugal pump with open or enclosed impeller. For poorly screened stock, use centrifugal pump with open type impeller.

Deckered Stock—Use centrifugal stock pump, with open impeller.

Sulphite Mill

Acid Pump—Centrifugal—Double suction or single suction type. Construction should be all-bronze or other special materials to resist the corrosive action of the liquor.

Lime Water Pump—Centrifugal—Double or single suction type. Regular fitted.

Blow Pit Pump—Centrifugal stock pump with open impeller. Regular or bronze fitted.

Screened Stock Pump to Deckers—Centrifugal—Enclosed impeller if not in excess of 1 per cent. For stock consistency over 1 per cent use centrifugal stock pump with open impeller. Construction regular or bronze fitted.

Deckered Stock Pump — Centrifugal — Open impeller, in regular or bronze fitted construction.

Acid Circulating Pump—Chemipulp or like systems require centrifugal pumps of special design, usually furnished as part of the system.

Soda Mill

Fresh Liquor Pump—Centrifugal—Single or double suction with enclosed impeller. All-iron fitted.

Liquor Circulating Pump—Centrifugal—Single suction type, with open or enclosed impeller. All-iron fitted. This pump is of special construction to withstand the high suction pressure and high temperature of the digester, and method of supporting should be such that expansion of the metal is compensated for, so as not to throw pump out of alignment with driver.

Black Liquor Pump—Centrifugal—Single suction, open or enclosed impeller. Construction should be all-iron.

Thick Liquor Pump from Evaporators—Centrifugal—Side suction with open impeller. Construction is all-iron and should be such as to compensate for the high temperature and high vacuums under which the pump operates.

Leaching Liquor Pump—Centrifugal—Single suction, with open or enclosed impeller. All-iron construction.

Blow Bit Pumps — Centrifugal — Open impeller. Regular bronze fitted construction.

Screened Stock Pump to Deckers—Centrifugal—with enclosed impeller if not over 1 per cent consistency. If consistency is greater than 1 per cent, use centrifugal stock pump with open impeller. Regular or bronze fitted.

Deckered Stock Pump—Centrifugal, with open impeller. Construction regular or bronze fitted.

Paper Mill

Stock Pump—Chests to Beaters—Use centrifugal stock pump with open impeller. Construction regular or bronze fitted.

Stock Pump—Chests to Jordan—Use centrifugal stock pump with open impeller, in regular or bronze fitted construction.

Machine Chest to Mixing Box Pump—Centrifugal stock pump with open impeller.

Mixing Box to Screens of Paper Machine—Centrifugal with open or enclosed impeller.

White Water Pump—Centrifugal with open or enclosed impeller.

Shower Pump—Centrifugal with open or enclosed impeller.

Suction Roll and Suction Box Vacuum Pumps—Rotary type vacuum pump or double-acting reciprocating vacuum pump.

Drying Rolls—Condensate Pump — Reciprocating pump, steam pump or rotary vacuum pump.

Broke Beater Pump—If for continuous operation and stock not over 3½ per cent, use reciprocating

type pump. If for batch work, use centrifugal stock pump with open impellers.

Beater Pumps in Mills Using Waste Paper—Use centrifugal stock pump with open impeller of special type. These impellers should be designed so as to avoid spinning or clogging of entrance to impeller from stringy material, or other foreign matter which might be carried over into the pump.

Reasons for Recommending Centrifugal Pumps

No attempt has been made in the preceding tabulation to specify any particular size of pump for the various services, as this is determined by the size of the mill, its tonnage output, and the head conditions for the particular installation in which the pump is to be used.

While to some it may seem unusual to recommend the centrifugal type of pump for all stock pumping services, assurance can now be given that centrifugal stock pumps, of correct design, and installed under proper conditions, can now be used for practically every stock pumping condition encountered in any pulp, paper or board mill, with complete freedom from clogging or air binding even when handling stock of high consistency, and with power consumption well within reasonable figures.

The clogging difficulties frequently encountered with the earlier types of centrifugal pumps handling stock at higher consistency are now practically unknown with pumps using impellers with screw type vanes at entrance.

Air binding, which was also a frequent cause of trouble and which was very often mistaken for clogging, has also been eliminated by proper design of the suction entrance of pumps, and to an even greater extent by fixing the discharge nozzle in a top horizontal position, so that air entrained in the stock is liberated at the highest point of the casing, and driven from the pump with the discharged stock.

The pipe connections between stock chests and pump suction should always be as short and direct as possible, and of a size such as to keep velocity of flow not over 4 to 5 ft. per second on stock up to 3½ per cent. For stock consistency greater than this, the velocity should be lower, and should not exceed 1½ ft. per second at consistency of 5 to 6 per cent.

The suction opening into the chest should, if at all possible, be out of the bottom of the chest, and not out of the side. The chest bottom should be sloped to the suction opening to facilitate pumping the chest down with the least waste of stock. Any bends or turns between chest and pump suction nozzle should be of the long radius fabricated type. The pump should always be installed well below the chest bottom, and even if this should necessitate a pit in which to set the pump, it will be found to be well worth the expense, because the pump will operate much more successfully, especially on higher consistency stocks, and it will also permit pumping the chest down to the very bottom. This method of installing should always be followed on installations where runs are comparatively short, or where color changes are frequent, and also when the stock handled is in excess of 3½ or 4 per cent consistency.

A word of warning relative to leaving the pump running after the supply of stock has been exhausted might well be given. The load on the driving motor decreases as soon as the pump stops delivery, and the unit immediately increases in speed. As the pump casing is only partially filled with stock, and the impeller rotating at high speed and pounding away at the enclosed stock, it may set up vibrations which after a time can be destructive to the stuffing box packing or bearings of the pump. The heavier the stock, the more severe it is on the pump parts. The pump should always be shut down just as soon as the supply has been exhausted.

Tests of Pumps Handling High Consistency Stock

During the past two years tests have been conducted on a number of centrifugal pumps in several mills, handling various kinds of stock of high consistency. The object of these tests was to obtain reliable data relative to the variations of pump performance in capacity, pressure, horsepower and efficiency from that of water, to that obtained handling stock of various consistencies; and to obtain additional information on the frictional resistance of high consistency stock in various pipe lines.

To overcome the defects of previous methods of reading pressures in stock lines, a special type of flexible diaphragm connection was developed after considerable experimenting and which, when set up between the stock line or pump and the pressure gauges, gave correct readings of the existing pressures.

Briefly, these tests showed that at consistency below 4 per cent, but little reduction of capacity occurred from that obtained on water. Above 4 per cent the capacity and pressures decreased rapidly, and at the highest consistency handled, 6½ per cent, the capacity dropped off considerably. Some pumps showed a capacity reduced to one-third of that of water, and others only one-tenth the delivery of that of water. With reference to the latter figure, this could be explained by lack of proper suction head on pump, and also the connecting piping between the chests and pump were not all that could be desired.

Power readings showed but little increase over water requirements at the lighter consistencies, and as the consistency increased the power requirements decreased, due to the reduction in both capacity and pressure.

The efficiency obtained varied with the consistency of the stock, showing roughly about 20 per cent less than that of water at consistency up to 4½ per cent, and at 5½ to 6 per cent or higher, the efficiency was roughly only about 50 per cent of that obtained on water basis.

The necessity of sufficient submergence, or suction head on the pump, and the need of short, direct and ample size piping and long sweep fittings on the pipe lines is very apparent when the flow of high consistency stock is observed. Sulphite at 5 per cent and groundwood at 6 per cent B. D. consistency can hardly be called a fluid, and its flow characteristics are more nearly that of a plug. Any contraction, or deviation from straight flow lines is accomplished only

at the expense of power or pressure, and the stock lines should be laid out to give the easiest possible flow lines, so as to keep frictional resistance and power consumption at a minimum.

To illustrate the resistance to flow of high consistency stock through pipe lines, an observed condition might well be cited. In one of the installations tested on high consistency stock, the stock was carried by gravity from the deckers to a chest through a 12 in. diameter pipe, sloping downwards at approximately 45° with the open lower end of the pipe roughly 10 ft. below the decker. With all water shut off at the decker, the stock would not flow freely through this drop pipe, but would pile up in the pipe until a large quantity was collected, giving it sufficient weight to overcome the resistance to flow, when it would then suddenly drop out of the pipe into the chest in a large slug, and this would again be repeated at intervals of about two minutes. These slugs of stock were hardly fluid, and would not settle out smoothly on the surface of the stock in the chest, but would float on the surface in cone shaped piles resembling large ant hills.

Importance of Piping on All Pump Installations

Ranking next to the pump, the piping is the most important part of any successful and satisfactory pump installation. The finest pump can be badly handicapped, or even rendered inoperative by faulty installation of piping. This applies particularly to the suction pipe. Improper selection of size of discharge pipe, especially using pipe of too small size or too long lines with numerous elbows and fittings, increases the head and may require a pump much larger and more expensive than necessary, and in addition consume unnecessary power all the time the pump is in operation.

Faulty installation of suction piping has actually been found to be the most frequent cause of pump failures, or dissatisfaction with pump installations. Providing a pump could create a perfect vacuum, with absolutely no losses in the pump or suction piping, atmospheric pressure would limit its maximum lift to 34 ft., but practical considerations do limit the reciprocating and rotary pumps to a maximum of 22 ft., while 15 ft. is considered the usual limit for the centrifugal type. These values apply only when handling cold water.

This so-called suction lift is not alone the vertical distance from the surface of the water to the pump proper. To the actual elevation must be added the friction through the suction pipe, foot valve and fittings, plus a foot or two allowance for velocity head. Data on friction of water in pipes and fittings is available in most handbooks and pump manufacturers' catalogs, and in selecting the size of suction piping, the total suction lift plus friction and velocity should not exceed the given limits. If liquids to be handled are hot, volatile or viscous, the values must be decreased and may require even a positive head on suction. Paper stock pumps should always be located so that the pump is under a suction head. The higher the density of stock, the greater should be the submergence.

Never use suction piping of size smaller than the suction connections of the pump, and in many cases a size larger will be found advisable, or necessary, especially if the actual lift is high, or suction pipe is very long.

Slope suction piping upwards and toward the pump on horizontal runs, and avoid all air pockets, or high points in the line. Absolutely tight joints are of the greatest importance, as air leaks may cause reciprocating pumps to pound badly, and will reduce the capacity, or even entirely prevent delivery on a centrifugal pump.

The bottom of suction pipe, when operating a pump under a suction lift, should be well submerged, and equipped with a foot valve and a strainer of liberal area.

While not so important for successful operation as the suction piping, the use of liberally sized discharge piping will often represent a substantial saving in the size of both the pump and motor, also in saving of power, by a reduction of the friction loss, especially if the discharge line is of considerable length. While a smaller size pipe may at first thought seem more economical, a comparison of pumping costs between the use of this and the next larger size of pipe may often show it advisable to use the larger size pipe.

A check valve and a gate valve should be installed in the discharge line, close to the pump. The check valve is a worth while protection to the pump against water hammer when shutting down the pump, and the gate valve will permit inspection of pump interior without draining the discharge line, but on a reciprocating pump, if a gate valve is used, a relief valve should also be placed in the line between the pump and gate valve.

When liquids are hot, very volatile, or vaporous, the pump should be located so that the liquid will flow to the pump under a positive head. With liquids of this nature, any reduction of atmospheric pressure caused by the pump suction, allows vapors to form, filling the suction pipe, reducing the capacity and often preventing the pump from delivering any liquid. Use of a large size of suction pipe is also advisable in order to keep the velocity down to a low value.

Paper stock, oils, bleach liquors, clay water, size, acids, and concentrated liquors, etc., do not flow as freely as water, and more power is required to force them through piping because of the greater friction. Large pipes should be used, to keep the friction losses and power requirements to a minimum.

Pumping problems involving such conditions, as a rule, should be submitted to the pump manufacturer, giving all data as to the nature of the liquid, whether acid or alkaline, its temperature, specific gravity, the viscosity at pumping temperature if possible; if stock, its consistency, the kind of stock, if bleached or unbleached, and any other information that will enable them to recommend pumps best suited for the service.

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◆ MODERN BUSINESS demands two kinds of capital: Money, and technical and scientific knowledge. A well-organized and well-directed staff of research men can achieve results in a business way which cannot be secured merely by great credits.—*Thomas S. Baker.*

Anti-Friction Bearings

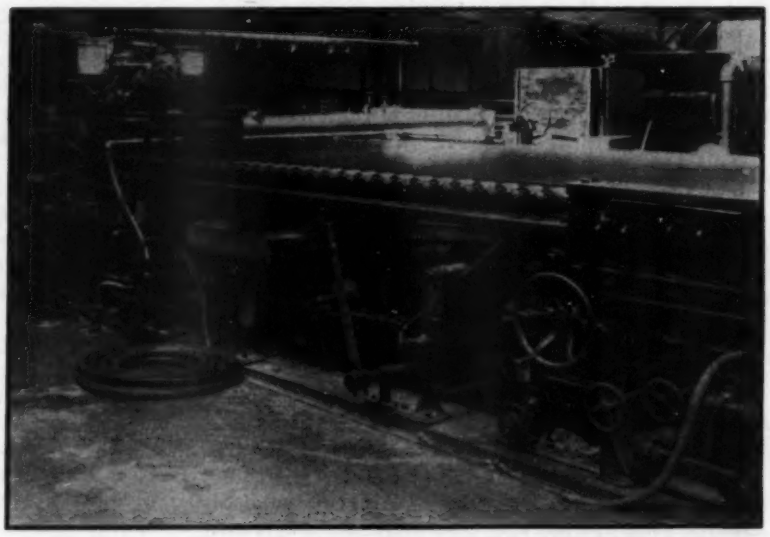
Make Real Savings in Paper Mills

By FRANCIS A. WESTBROOK, M. E.

ANNUAL savings of $10,000, $650, $4,000, and $2,250 have been realized, respectively, by four representative paper mills through the installation of anti-friction bearings.

In the first case, the mill became appreciative of the advantages of anti-friction bearings when it installed a new fourdrinier. This machine was equipped with 344 anti-friction bearings, such bearings being used for all applications other than those on the presses and dryers. The performance of this new machine proved so satisfactory that two other paper machines in the plant were partly equipped with similar bearings. The life of the wire of the larger of the two modernized machines was increased from about sixteen days to twenty-one days through this change. Estimating on this same basis, approximately 4.6 wires per year, or the equivalent of $2,140, would be saved by the new machine together with the resultant saving in production time through the use of anti-friction bearings. Conservative estimates have also placed the saving in power for the new machine at 25 per cent, which under normal operating conditions would approximate $5,500 per year.

Another interesting comparison may be drawn from the modernized machines. Each of these machines, when equipped with the old bearings, had to have at least one bearing re-babbitted every week and required practically the entire time of a man for oiling. The small bearings of the modernized machines are now packed every three months with grease, while the larger bearings are greased only once every six months. Savings amounting to $1,280 per year for lubricant and $1,080 for labor and bearing material have been made by the new machine over operating cost figures for the old machines. As yet no figures have been evaluated for the two modernized machines. There is no doubt, however, but that these savings have been substantial. A recapitulation of the savings mentioned for the new machine will show an annual saving of $10,000 for this machine alone.



Fourdrinier wet end equipped with anti-friction bearings

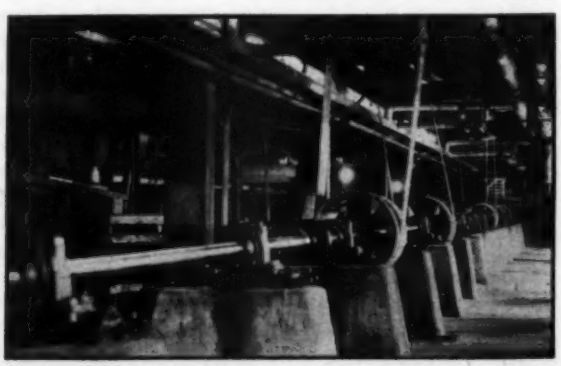
This second mill installed anti-friction bearings on the five cylinders of its board machine as well as on several of the felt rolls. Waterproof type bearings were used to eliminate much of the trouble resulting from water. The bearings were also sealed against oil leakage.

Savings through the installation of the cylinder mold and felt roll bearings have been placed at $650 per year. Of this amount, $475 has been attributed to increased life for cylinder mold wires; while a decrease of about 91 per cent in lubricating costs accounted for the remaining $175. In addition, there has been an increase in felt life which, in these calculations, has not been taken into account.

The third mill, another board plant, had noticed that the life of the felts and wires on two of its machines had been far from satisfactory. To improve this condition, they applied individual automatic drives to the cylinder molds of these machines. This installation did not give satisfactory results. It was, therefore, abandoned and the cylinder molds and couch rolls were equipped with anti-friction bearings and other minor changes made. An increase of fifteen per cent in both felt and wire life resulted from these changes, and most of the credit for this saving has

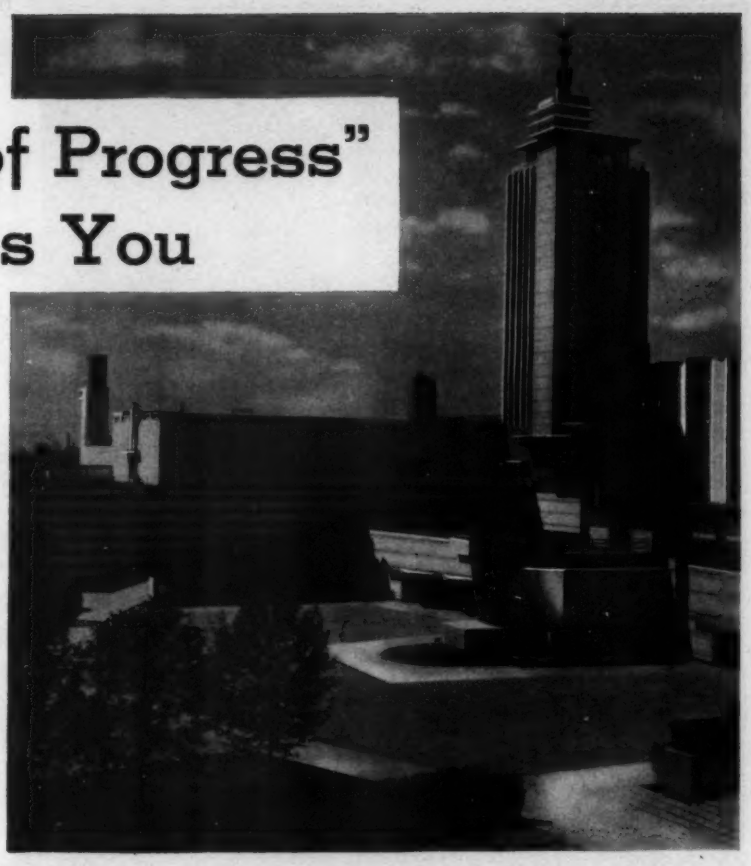
(Continued on Page 206)

Typical anti-friction bearing installation on Jordan



Line shaft showing several anti-friction bearings

"A Century of Progress" Beckons You



AN attraction that may be likened to that of a giant magnet has caused and is causing people from all over the world to visit *A Century of Progress* in Chicago. Its pulling power through an upheaval of economic conditions such as that through which the world has been passing during the past few years is little short of marvelous.

The site of *A Century of Progress* is made-land. Not many years ago the waters of Lake Michigan covered it. These waters have been pushed back by patient and tireless filling with sand and gravel from the bottom of the lake and even an island has been created out beyond the shoreline.

Upon such a foundation and covering over four hundred acres of land the magic city of *A Century of Progress* grew. Some of the buildings seemed to spring up almost over night. Most of them are ultramodern in architectural effects. Many of them have no windows. They are in reality largely unbroken planes and surfaces of building board and plywood arranged on light steel frames that present an appearance at first gaudy but, nevertheless, graceful in its simplicity.

Although the grounds and buildings are impressive by day they are even more so at night. The marvels of modern lighting, as soon as darkness comes, converts the entire panorama into a veritable fairyland.

Fifteen thousand incandescent bulbs, ranging in capacity from 10 watts to 3,000 watts, are said to be used at *A Century of Progress* for exterior illumination alone. In this arrangement is one battery of twenty-four search lights located at the south end of the grounds that has a light output of 1,920,000,000 candle power. Special colored lighting for fountains, simulations of cascading waterfalls, and other special displays add to the beauty of the effects created by the scientifically controlled clear lighting.

Within the buildings, inverted lighting, shaded arrangements and unusual color effects vie with one another for dominance. In fact, the lighting of each large exhibit building is distinctly individual with so much depending upon the architecture and color of the building as well as its location in relation to its surroundings.

The entire theme of the fair is one of science—both pure and applied. Through it there has been a joining of hands between science and industry, which permits fuller appreciation as to how the basic sciences of physics, chemistry, mathematics, etc. have made possible the marvelous age in which we live. Nothing that might be written about the wonders to be seen would be exaggerative, but to enumerate them would be far too great a task than to even suggest.

Not only have the creators of *A Century of Progress* done a good job in their appeal to man's intellectual side, but they have also provided a variety of interesting amusements. The Sky Ride, to mention only one of them, is an important engineering achievement. In this case, suspended on a two hundred foot level, between two towers, which stand 1,850 feet apart and six hundred and twenty-eight feet high, is a cableway that carries a number of rocket-like appearing cars. The cableway has a breaking strength of 220,000 pounds per square inch of cross-section and its span is said to be second only to the George Washington bridge across the Hudson River in length. Observation floors at the top of the towers permit marvelous views over a wide area to be seen. Then from one of the rocket-like appearing cars as it somewhat lazily crosses the lagoon which lies between the two supporting towers one can obtain additional thrills.

In passing, it should be stated that in this pageant of man's accomplishments during the past century papermaking has not been forgotten. The Paper Foundation exhibit, planned as an educational feature to stimulate interest on the part of the layman in the many uses of paper, has received many favorable comments and has been viewed by thousands.

One feature of this exhibit is the "House of Paper." Its walls and ceilings and much of its furnishings and decorations are made of paper.

Nearby the paper house is what is said to be the smallest paper machine in the world. It is a fourdrinier and produces paper in an endless sheet, approximately four inches wide, and winds it into a roll. This machine was loaned to the exhibit by the American Writing Paper Company.

Paper is also made by hand at the exhibit of The Paper Foundation. This work is done by students from the Institute of Paper Chemistry in equipment loaned by the Institute.

There are also exhibits of the products of nearly thirty paper manufacturers to complete the papermaking display.

In only a comparatively few months the exposition, which has cost millions to create, is scheduled to close. Nevertheless, it will live for all time in the memory of those privileged to see it as a reminder of man's scientific discoveries and their application to industry and business during the past one hundred years—surely a century of progress.

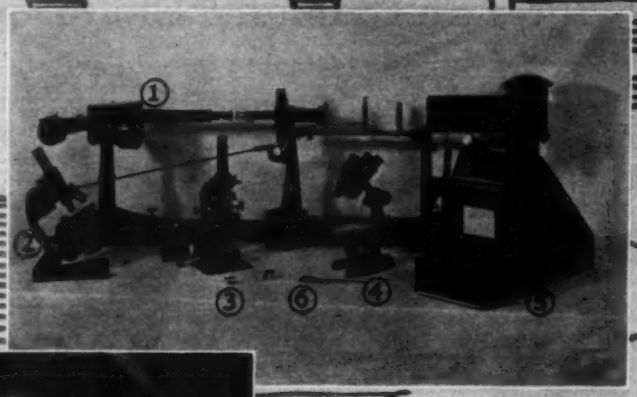
The following two pages illustrate some of the exhibits at A Century of Progress.

Left — Miniature paper mill, equipment for making hand made paper, and for paper testing in The Paper Foundation's exhibit

Right—Portion of the showcase display of paper products in the exhibit of The Paper Foundation

Left—Interior view of the House of Paper, depicting uses of paper in building construction, home furnishings and decorations

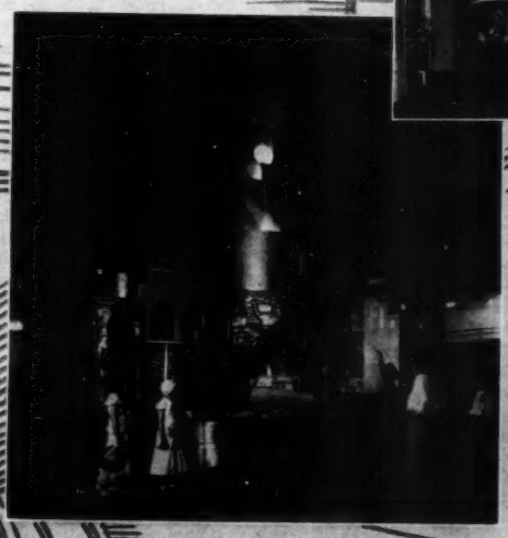
Right—The exhibit of the Kalamazoo Vegetable Parchment Company



Right—(1) Spectrophotometer; (2-4) Microscopes; (3) pH colorimeter; (5) Opacimeter; (6) Smallmagnifiers—Bausch & Lomb exhibit

Left—General view of the Link-Belt Company exhibit. Note huge conveyor chain link forming main entrance to exhibit

Right—Extensive exhibit of Westinghouse showing equipment exhibits on main floor and massive illuminated facade



Left—Major feature of the principal subsidiary manufacturing companies of the United States Steel Corporation showing major uses and application of steel. Note working model of Bessemer converter

Starting Electric Motors
After an Extended Shut-Down

By A. W. RAY,
Service Manager
Reliance Electric & Engineering Co.

IF your motors and generators have been idle for some time, why not have them inspected now. Dirt and dampness may have reduced your factor of safety.

The megger test is suggested as a simple and still fairly accurate indication of insulation between windings and the ground. U. S. Navy Specifications require a reading of nearly one million ohms on 230-volt machines, though good new motors will easily show five to fifty million ohms. Should megger readings show zero, check for a breakdown calling for repairs. If motors show any reading less than 500,000, plan on a general cleaning and drying. Clean thoroughly first and then test again with the megger. If readings are then satisfactory, no special drying out will be necessary. If readings are still low, there is a good chance that dampness is present.

For cleaning windings, use gasoline or benzol if ventilation is good and there is no danger from explosion or fire. Otherwise, carbon tetrachloride is recommended as a safe and efficient agent for removing oil, grease and dirt. When dry, apply a coat of good insulating varnish, brushed or sprayed on.

A baking oven with good ventilation is ideal for drying, but if not available, motors may be mounted on an insulated base and connected to the line and run idle. (Caution: While motor or generator is mounted on the insulating base, be careful not to handle any metal parts promiscuously.) Shunt fields will normally dry out under this test, and if surrounding atmosphere is normal, the other windings will probably be helped considerably.

In the case of a generator, it is sometimes simple to run with main armature leads shorted through a suitable resistance and with field circuit open. If this does not give enough current, the application of a small external voltage to the shunt field will usually be sufficient.

It is also practical to run motors as generators as described above for drying armatures and series coils. In all cases a 6 to 10-hour run should be made in order that all parts will be uniformly heated and dried out.

Check commutator and brush rigging. Commutator must be smooth, round and the mica undercut or at least flush. Brushes should be free acting, fit commutator perfectly, and have some leeway for wear.

In the case of sleeve bearings, check for wear and if excessive change at once. This is very important in the case of induction motors. Draining and cleaning of oil wells, with addition of new oil, is good insurance.

As to ball bearings, particular attention should be given to the lubrication. Some greases have a tendency to separate and oxidize. Should this happen during a shut-down period, the grease may harden over the balls and raceways so that the bearings fail to function. Most ball or roller bearing motors and generators can be turned over freely by hand. If much effort is required, trouble should be avoided by examining the insides of the bearing housings.

Flush out the old grease with gasoline, benzine, kerosene or carbon tetrachloride and then flush with warm lubricating oil. Try the rotating element to see if easier to turn over and keep running. Repack the bearing about ¼ to ⅓ full of an approved ball-bearing grease. Do not overfill.

Exposed ball bearings should be guarded carefully against the admission of dirt. The housings should be inspected to make sure original seals used to prevent entrance of dirt, etc., are still in good shape.

Last, but not least, make sure equipment has not been robbed of important parts as spare for other equipment. Inspect carefully and if possible make a complete electrical test.

While armatures and shunt fields have been referred to specifically, a-c. stators and a-c. wound rotors should be included. Low d-c. voltage applied to stator is one method to get heat for drying-out process. Also, low a-c. voltage with rotor removed is another method used occasionally. Rotor windings, slip-rings, brushes and brush-holders should be given the same careful inspection as noted under equipment for d-c. machines.

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◆ Lubrication Troubles in Hot Weather

Hot weather often causes troubles with machinery which had operated throughout the balance of the year without any difficulties. The viscosity of the oil used for lubrication purposes decreases with increasing temperatures so that at the higher temperatures the oil tends to lose its "oiliness." Where summer temperatures are high enough, the viscosity will decrease to such an extent that shafts may score and cut, bearings melt, and shut downs occur.

Where a circulating lubricating system is in use, hot weather may clearly suggest the advisability of increasing the rate of circulation; and, perhaps, of forced cooling of the oil, thus combating higher temperatures by more rapid heat dissipation. Where oil rings are used, it is often worth while to filter the oil, use a larger quantity and even circulate it. Sometimes it is best to change oil by entirely replacing that used with new oil. Where steam is encountered, it is especially desirable before the arrival of hot weather to test all oils for emulsification with water, because the highly fatty oils used in steam cylinders sometimes work into the circulating system with the result that emulsification occurs in the presence of water.

Filtering always improves oil and so helps to lower oil temperatures. Frequent filtering — continuous filtering where feasible—always increases the life of any lubricating oil, the first cost of the filter being more than covered in due time by the savings in cost of oil. Where a wide range of temperature is encountered, it may be advisable to change the oil at the commencement of hot weather, changing to an oil having a higher viscosity and then going back to one of lower viscosity during the colder months.

Where very heavy machinery has to be started up during hot weather after protracted idleness, the starting friction will be extremely high—much higher than usual—due to the oil having been squeezed out between journal or shaft and bearing. Hot weather with its effect upon viscosity of the oil hastens this condition. It is possible, however, to lessen this static friction by pouring a few quarts of oil over the shaft, so that the oil can trickle down each side and enter the interstices of the bearing metal.

Another hot weather stunt, which may sometimes enable equipment to stay in service instead of being shut down or damaged, is to add deflocculated graphite to the oil. This practice may often be used to good advantage during an emergency when no other alternative is practical. A little deflocculated graphite can be fed to the bearing at frequent intervals, thus enabling the bearing to cool off without further attention. About one-half of one per cent by bulk of graphite should be mixed with the lubricating oil and the mixture fed to the bearing. It is advisable not to use more graphite than will serve the purpose because the graphite has somewhat of a tendency to clog the feed pipes and grooves.

Another emergency remedy — often valuable in conjunction with a change of oil — is to pack the outside of the bearing with ice; while still another solution may be to circulate cold water around the bearing. Care should be taken, however, to keep water away from the hot oil, as an explosive effect will follow when the water is converted into steam. And then, water is extremely injurious to the lubricating properties of the oil.

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◆ MUNISING PAPER CO., Munising, Mich., has appointed Raymond & McNutt Co. as its Caslon agent in Philadelphia. A. E. Baur, formerly of Charles Beck Co., and C. M. Cook, formerly with Satterthwaite-Cobaugh Co., are now associated with Raymond & McNutt Co. in charge of Caslon and sulphite sales.

Wisconsin Valley Safety Conference

Safety education and its relation to industrial efficiency is theme of meeting. Every paper mill in section sends delegation

THE safety men of the Wisconsin Valley, under the leadership of J. J. Plzak, Franz H. Rosebush, Fred Braun and Walter F. Simon, have had experience in heading up the affairs of the parent section in the National Safety Council, and this experience bids them shine when they hold a conference at home. Their third conference, held June 22, for program lay-out and general arrangements was a gem.

An attendance of 144 responded to their call, the paper mills of North and Central Wisconsin sending two-thirds of the registration. Every paper or pulp mill within the territory served by the section sent a delegation.

The Wisconsin Valley plan is to occupy fully one day, with time morning and night for auto transportation. Sections for Paper and Pulp and "all trades" were held in the morning. A general session brought all together in the afternoon. An evening dinner meeting wound up the day and started the delegates homeward at a reasonable hour. The registration cost this year was set at $1.25, which included the evening meal, and was found sufficient to cover all expenses.

Paper and Pulp Section

The Paper and Pulp Section, meeting in Eagles Hall, was presided over by Fred Braun, chief engineer of the Employers Mutual of Wausau. Mr. Braun introduced J. J. Plzak as the first speaker Mr. Plzak spoke on "Methods of Securing Safe Practices," and accented the value of training employees for all phases of their work. Safety is part of good production in Mr. Plzak's mills. He made special mention of the new Safety Instruction Cards, recently published by the National Safety Council and showed how they fit into the plan.

Mr. Plzak gave the conference the invitation of the Wisconsin Rapids mill of the Consolidated Company to visit its plant during the noon recess or later in the day. The plant, which is under the management of C. E. Jackson, a former safety engineer, is an illustration of the policy of making safety and good workmanship synonymous. In the plant, as Mr. Plzak explained, safety is not treated as a specialty. Accident prevention is linked with prevention of other waste. Safety activities are expected of every foreman as part of good production.

The remainder of the morning session was occupied by five rapid-fire speakers, alloted ten minutes each under the topic "Paper Mill Close-Ups."

The first speaker of the series was Andreas Christensen, sulphite superintendent of the Rhinelander Paper Co., who substituted for George Roller, of that company, who was unable to be present. Mr. Christensen mentioned the work of the men on the log piles as the most hazardous job in the wood yard. He also termed hazardous the work of the men who cut stakes and dump logs into the pond. Such work, he said, calls for speed, experience and timing. In the wood room, the man working on disc barker needs both training and perfect machine equipment. He and the splitterman must be quick in thinking and acting. Riding conveyors Mr. Christensen termed as foolish, and a practice that should be forbidden. In the groundwood mill, a warning was given regarding hot stones and a sudden shower of water. Throughout the wood room, Mr. Christensen urged training, signal practice regarding the use of electricity, and team work.

Franz Rosebush, safety engineer of Nekoosa-Edwards mills, presented the topic of "Sulphite Mill Hazards." He made use of the Safety Code to point out major hazards and made a practical demonstration of the value of that document for purposes of training and spotting hazards. He then told of some experiences of his own in accidents not in the book, showing the need for knowing men as themselves often introducing the unexpected.

"Paper Machine Hazards" was the subject taken by G. H. Suhs, chief engineer of the Rhinelander Paper Company. Mr. Suhs had gone through the records of accidents in his own mill. Out of four lost-time injuries in two years, only one could have been prevented by machine equipment. Mr. Suhs said that we have three major classes of hazards, on the machines-winder, reel, and calender stack. He gave a good word for a winder guard developed at the Flambeau mill, Park Falls, which has the advantages of strength, automatic rotation and requires but little attention.

Warren E. Beadle, Jr., of the Biron mill, Consolidated Water Power and Paper Co., maintained the high standard of the discussions in his presentation of Maintenance Departments' Hazards. Mr. Beadle brought out the thought that men in the mechanical department of a paper mill are subjected to the hazards of many trades. They deal with saws, machine shop hazards, welding dangers. They are subject to painter's risks, and occasionally to explosives. They must handle heavy machinery often without cranes, and in small spaces. They are subject to night and Sunday calls and are expected to do things on the rush. Mr. Beadle's advice was: "Select the man who learns best how to do the job. Give him all the information needed, especially engineering information, and then provide him with safe practice pamphlets."

F. H. Coldwell, of the Nekoosa-Edwards Paper Company, gave the closing talk of the series, dealing with "Hazards of the Power Department." "Electricity and steam," he said, "as furnished these days of modern power plants, come in high voltage and extraordinary temperatures. For their use the machines provided are efficiently planned, but trained men are needed to run them." Mr. Coldwell said that the hazards of the power department are mainly those related to the human element. He gave illustrations of accidents in which the boiler or machine was in good condition, but the human factor was not up to demand.

Coming from different places and varied environment the speakers on paper mill hazards were much of one mind, that the present stage of accident prevention must take the human approach and train men for safety as for manufacture.

All-Trades Section

The "All-Trades" Section, meeting at the Hotel Witter was opened by chairman Jere Witter, of the Prentiss-Wabers Manufacturing Co., Wisconsin Rapids. This section was under able sponsorship including the Wisconsin Industrial Commission, the local Vocational School, the Chamber of Commerce, the Public Utility Companies of the vicinity and state, and state and national insurance companies.

Three addresses featured this program. C. B. Boulet, well-known to Wisconsin paper and pulp men, head of the safety organization of the Wisconsin Public Service Corporation, spoke on the "Safe Use of Electricity in Industry." Mr. Boulet addressed his remarks to the lay worker, refusing to be stampeded by the presence of electrical engineers. He brought out the immense advantage of electricity to industry and showed how it remains always under law. Master the rules and electricity is a docile servant. He emphasized two phases of responsibility for safety in the handling of electricity: that of the power company, which consists in safe delivery of power to your plant; and that of industry for its safe use. He said that the power company's job is likely to be done better because of experience with high voltage power requiring good equipment and well-trained men. Industry has much to learn, especially in smaller

plants. He urged that sub-station equipment of the power company be let entirely alone, and gave practical suggestions as to the safe use of electricity by workingmen and home-owners. "Learn all you can about electricity," was Mr. Boulet's suggestion; "and then keep away from those aspects of it for which you are lacking in equipment and experience."

"Industrial Housekeeping," on a vast scale, was presented by E. J. Smith, Western Electric Co., Hawthorne Station, Chicago. Mr. Smith told of the advantages of the contest method in plant housekeeping, and showed the close connection of orderliness with plant safety. Mr. Smith also addressed the meeting of the local Kiwanis Club, meeting at noon in the Hotel Witter.

The paper industry contributed an address to the All-Trades Section in the person of W. J. Peacock, head of the department of personnel, Northern Paper Mills, Green Bay. Mr. Peacock had been announced to speak on "Near Accidents and the Lessons We Learn From Them." He modified the theme, however, and talked about The Mishap Back of the Injury, showing that a near-accident is not a thing to feel relieved about but to be taken as a clue to a plant's greatest source of waste, human mistakes. Human mistakes mean important wastes of many kinds. The element of loss becomes misfortune when it means injury. The safety movement is discovering that a minority of employees usually cause most of a plant's accidents. "Accident-prone" is the term applied to such men.

What to do with the accident-prone man becomes a problem. It is being proved that he can be trained and cured. The experience of the Cleveland Railways Co., making its peak safety record on a division which had formerly been the accident "Jonah" was quoted. The method to be followed is to deal with the individual.

General Session

The General Session meeting in the afternoon brought out the views, largely extemporaneous, of two plain-spoken men, each gifted with a sense of humor. Hon. Edgar G. Doudna, secretary of the Board of Regents of Wisconsin Normal Schools, was slated to speak on "Public and Home Safety." Instead he painted the social background upon which all safety education must do its work. He paid industry the compliment of being about the only institution which takes time off to study itself. Mr. Doudna encouraged safety-minded men to believe that education can and does change human nature. He said that the slogan "You can't make people good by law" needs a counter-saying that "people can be made to mind the law." The purpose of trying to make people think is worth while. "Will you back your school teachers when they tell the truth?" was one outstanding question Mr. Doudna offered.

C. E. Jackson, superintendent of the Wisconsin Rapids mill, Consolidated Water Power and Paper Company, speaking on the subject "Management's Responsibility in Accident Prevention," dismissed the topic briefly as probably the question of some junior safety man. He stated that the law makes management one hundred per cent responsible for plant accidents with the possible exception of heat strokes and causes termed "acts of God." Mr. Jackson dealt severly with certain outmoded falacies of safety such as: pasting a plant full of grewsome posters; the sympathy gag; pay-envelope appeals a bubbling over with good will; the carnival method which tries to slip safety over on a musical wave.

Constructively, Mr. Jackson made an appeal for honesty in appeals to workmen and avoidance of camouflage. He said, "Let's tell our men the facts, that safety is good business and ask their co-operation in it as in other matters of efficiency. Let's impress upon our foremen that safe working methods are part of their function in handling men."

Dr. R. W. Rice, of Stevens Point, accustomed to industrial practice, brought valuable suggestions regarding "Health and Its Relation to Accident Prevention." "Usually," said Dr. Rice, "I am called upon to follow up accidents. It is good to have a chance to say a word which may help in accident prevention."

The speaker declared that physical disability is a handicap to the worker. Disease among employees handicaps them on the job, predisposes them because of worry or weakness to injury, and adds to the severity of any injury they may sustain.

At the dinner session, after an address on "Fossilized Minds" by President F. S. Hyer, of Stevens Point Normal School, Mr. Plzak made an effort to place the conference for next year preferably in the western part of the state Eau Claire and La Crosse were sounded out and either city may be heard from.

The conference was then adjourned, after a very profitable day.

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◆ Institute Confers First Ph. D. Degrees

Four graduates of the Institute of Paper Chemistry have been granted the first Doctor of Philosophy degrees in the history of Lawrence College. The degrees were conferred at the eighty-third annual commencement exercises at Lawrence on Monday, June 12, by Dr. Henry M. Wriston, president of the college and director of the Institute.

The candidates were presented by Dr. Harry F. Lewis, dean of the Institute, and they were invested with their hoods by Dr. Otto Kress, technical director.

Those who received the degree, are: Harold William Bialkowsky, Holyoke, Mass.; Roy Liston Davis, Athens, Maine; Edwin Laughlin, Delaware, Ohio; and Edward H. Voigtman, Sheboygan, Wisconsin. Sixteen men were enrolled originally in the class to which these four belonged.

Commencement day at Lawrence marked the termination of three and one-half years of educational and research work by the Institute of Paper Chemistry.

Anti-Friction Bearings

(Continued from Page 200)

been given to the anti-friction bearings. The savings in felt costs per machine amounted to $1,705 per year, while the wire saving per machine amounted to $280. There was also a reduction in lubricating costs of $7.50 per machine, a significant sum when the small number of bearings are considered. The application of anti-friction bearings to these two machines, therefore, developed savings of approximately $4,000 annually.

A large paper manufacturer in New York State, the other mill to which reference has been made, had trouble with the wrinkling of the wire on a large fourdrinier machine. A diagnosis of the problem revealed that the carrying rolls which were equipped with babbitted bearings did not run free enough. The trouble was eliminated by equipping four of the carrying rolls and the breast roll with anti-friction bearings. Records of the cost department showed that these few bearings were responsible for a reduction in the cost of wire replacement and labor amounting to at least ten cents per ton of paper or, in other words, a saving in a normal year of about $2,000. A saving of about $250 per year also resulted from a decrease in lubrication costs, the old bearings requiring about a gallon of oil every twenty-four hours and oiling every two hours, in contrast to only two pounds of grease per week for the new bearings.

A midwestern mill, not suggested in any of the previous references, equipped one of two Jordans of practically identical design with anti-friction bearings in place of plain babbitted sleeve bearings common to the second machine. Comparative costs showed a saving of approximately $760 per year for the anti-friction bearing equipped Jordan over the other unit, or 95 per cent per year on the investment.

The evaluated savings included lubrication and inspection of bearings, Jordan filling renewal, cooling water for bearings, and power consumption.

At the same time, the anti-friction bearing Jordan had less vibration, permitted slower operating speeds, and had greater capacity on hard brushing than the plain bearing machine. Likewise, there was no settling of the plug due to wear of the bearings, a condition common with plain bearing machines.

Although only a few paper mill applications for anti-friction bearings have been mentioned, and typical results of only a few mills cited, the data presented certainly indicates the possibility of anti-friction bearings in reducing costs of operations in pulp and papermaking.

The illustrations used with this article were reproduced from photographs supplied by S K F Industries, Inc.

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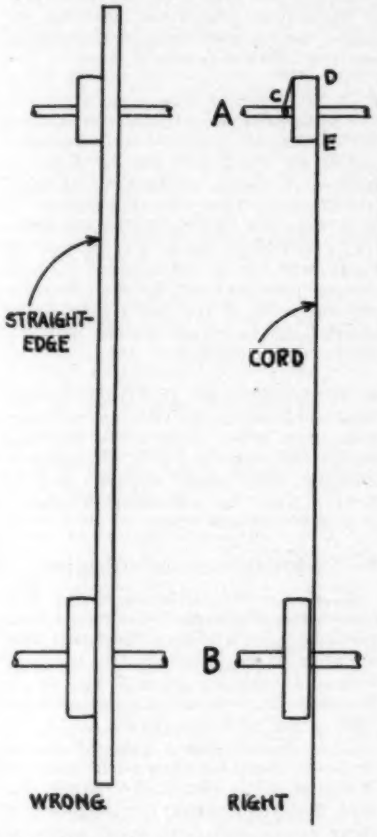
◆ D. BENEDETTE, Inc., waste paper packer, dealer and broker, 518 Water St., New York, has announced that a substantial stock interest in the firm has been acquired by Robert Gair Co.

How to Align Pulleys

By W. F. SCHAPHORST, M. E.

HEREWITH is a sketch showing a method of aligning pulleys which is commonly used and which is labeled "Wrong." A long slender pole or board is used as a straightedge in the manner shown. The method is all right provided the straightedge is really straight, but nine time out of ten it is not. It may have every appearance of being straight when lying on the floor, but when lifted and supported at one end it may deflect more or less and become inaccurate and undependable. Therefore, don't use a long slender pole, stick, or board as a straightedge for aligning pulleys.



A method that assures true alignment is illustrated at the right and is labled "Right." Use a cord instead of a straightedge. A cord is preferable because it can be carried around in one's pocket and is available almost anywhere on a moment's notice. Then when pulled taut, a cord is always perfectly straight with respect to a vertical plane. A cord does not warp.

For example: To align the pulleys on two parallel shafts, *A* and *B*, tie the cord to shaft *A* as at *C*, hitch it around the pulley so that the cord makes a contact at two points, *D* and *E* almost diametrically opposite. When just touching at *E*, the cord is an accurate gauge for locating the pulley on shaft *B*. As indicated in the sketch, the pulley on shaft *B* will have to be moved to the right or the pulley on shaft *A* will have to be moved toward the left to secure proper alignment.

The pulleys marked "Wrong" have every appearance of being in perfect alignment, but they are not. The straightedge is not straight. Check it and find that it is crooked.

Another method employed in installing machinery that is entirely too common is to simply sight across from pulley to pulley, place the machine at approximately the desired spot, and then shift the machine by the cut and try method until the belt stays on the pulleys.

The fact that a belt stays on pulleys isn't proof that the pulleys are accurately aligned. A tight belt on crowned pulleys will offset considerable misalignment, the belt will stay on and the drive will look all right. It is better practice to first align the pulleys accurately. Then the belt needn't be operated so tight. Such a belt will pull more, will operate more efficiently, and will last longer.

A thing to watch out for in the aligning of pulleys is pulley wabble. It is obvious that if the pulley on shaft *A* is not on square, the cord may not be exactly at right angles with the shaft. Therefore it is always advisable to rotate the pulley and try the cord in several positions. If the pulley wabbles the cord will indicate various locations for the pulley on shaft *B*.

Of course, one must also make certain that the shafts are parallel. Unless the shafts are parallel, all of the above work will be of no avail. If they are not parallel, make them so.

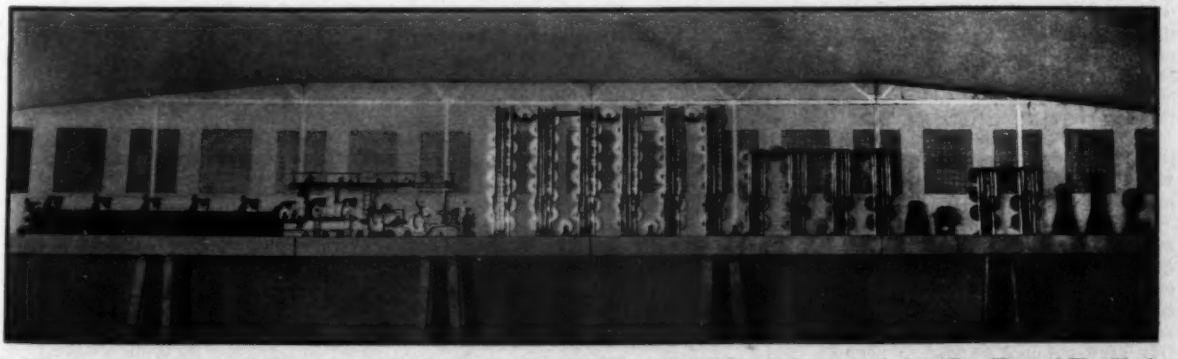
◆ Purchase of 225,649 Acres of Forest Land Approved

Purchase by the Federal Government of 225,649 acres of forest land in a dozen eastern States was approved by the National Forest Reservation Commission June 20. Approval of these lands for purchase followed closely upon action upon 443,908 acres, making a total of nearly 670,000 acres approved for purchase within a month.

The new lands will help to round out the areas of existing National Forests in the Eastern and the Lake States Forest regions. Their acquisition will in some measure simplify the program of Emergency Conservation Work, as under the options taken on the lands the Federal Government is given the right to enter upon them for improvement work immediately upon approval of purchase.

The total cost of the lands to be acquired as a result of this action will be $468,442.70. The average price per acre is $2.08.

Members of the National Forest Reservation Commission are the Secretaries of War, Interior, and Agriculture; Senators Keyes of New Hampshire and George of Georgia; Representatives Clarke of New York and Doxey of Mississippi; John E. Burch, United States Forest Service, Secretary.



Bogalusa's new cylinder machine served as the basis for this unusual presentation which was made by Allen Hyer of The Black-Clawson Company before the recent annual convention of the American Pulp and Paper Mill Superintendents Association. Upon panel boards carrying a sketch representing the background of a mill interior, Mr. Hyer placed part by part miniature representative pieces of the machine, each accurate as to detail and made one-sixteenth actual size, until the assembly was completed, thus showing the entire machine in front elevation.

The Buyer of Printing Looks at Your Paper

By ROGER WOOD

WHAT impression do packages of your paper make on the printers' shelves?

Of course, some of the large printers have stockrooms for paper storage, but a lot of shops store their paper where it is seen by most employees of the shop and an occasional customer who wanders "back-stage."

Is your package designed so that it will look neat and attractive on the printers' shelves?

The point is, when you consider a change of design and appearance of your packaged reams, you should give consideration to the printers' shelves as well as the jobbers' display.

Many mill executives, too many in fact, consider that their job is finished when the paper is delivered to the printer and seemingly a lot of them think only as far as the incoming shipping platform of the jobber's warehouse.

The mill that makes the paper has a parental responsibility for its product from the mill to the printing buyers' stock room or mailing department.

No matter how neat, attractive and even inviting your package may be in appearance or how outstanding the quality of your product, if the printer that converts your paper does not package his finished product neatly and conveniently as well as attractively, then you are losing an opportunity for repeat business. The buyer of printing sees the package that comes from the printer —not how you deliver your paper to the printer.

Most printers, a considerable percentage, just have no appreciation of the sales value of a neat and attractive package; they have no idea how to send out their finished product—your paper, remember.

In fact, most printers use a kraft wrapping and think of the package as a bundle. They feel they are doing a good job if they use gummed tape instead of twine or rope.

People like to have their printing delivered in convenient packages. Take the packaging of letterheads: A few printers have gone far enough to deliver the letterheads they print in cardboard boxes, and the few who have progressed this far use a set-up telescope box.

Have you ever tried to get some stationery out of a telescope box? No? Well, ask the office manager or stenographer.

They will tell you that it's almost as much of a task as opening a can of sardines with one of those keys they tack on the box. Usually, the package becomes torn in the process and makes a package almost as unsightly as the untidy kraft-wrapped bundle.

It's the printer's package and his worry—sure—*but it still is your paper and carries your watermark.*

Because you consider the paper good enough to have it bear your trade-mark, you should use every means to see that the printed product, the finished job, is delivered to the buyer in a neat and attractive package and in an easily accessible one, a convenient one.

Show printers how to improve this delivered appearance of their work and you will help that printer. In some cases, it will mean the difference between a lost account and a pleased customer for him.

Get the thought over to the printer that an untidy package means a high turnover of accounts . . . that neat, attractive and inviting packages mean repeat business and steady customers.

The paper mill that takes the initiative in this field will make many new friends among the printers—more than friends, for they will not only become boosters but will give your papers the preference whenever possible.

Printers preferences will attract the most desirable jobbing accounts to you; virtually, give you your pick of accounts.

There is a big field for development and improvement in the packaging of the printers' finished product. It will help the printers sell more printing and help them get a better price for their work.

But best of all, it will help make the buyer of printing have a better appreciation of, more respect and confidence in your brands of paper.

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◆ Westinghouse Gives Pay Increase

Notice of an immediate raise in salaries and wages has been received in all offices, works and subsidiary companies of the Westinghouse Electric & Manufacturing Company.

The Westinghouse pay increase will add to the purchasing power of thousands of workers and will be effective in all sections of the country. Definite action such as this announced by President Merrick is further proof that electrical executives have assumed leadership in the nation-wide Industrial Recovery Program undertaken by President Roosevelt.

◆ C. M. CONNOR, Glassine Paper Co., West Conshohocken, Pa., has been accepted by the Joint Committee on Approved Pulp Testing Chemists, and is listed as an Approved Mill Pulp Testing Chemist, as of June 16, 1933.

◆ Gair Subsidiary Acquires Container Plant

Formation of the Syracuse Container Corporation, to take over the business of Delavan Corrugated Box, Inc., of Syracuse, N. Y., and the Seneca Fibre Products Company of Skaneateles, N. Y., was announced yesterday. The newly formed company is affiliated with the Robert Gair Company, Inc., which operates paperboard mills at Piermont and Tonowanda, New York; New London, Connecticut; Haverhill, Massachusetts, and Bogota, New Jersey.

This affiliation is expected to put the Syracuse Container Corporation in an unusually advantageous position with respect to its supply of raw materials of the several grades and varieties required for its production of corrugated and solid fibre products.

◆ A THREE-DAY conference to formulate plans for immediately tying in with the National Recovery Act, recently passed by Congress, will be held in Bridgeport, Conn., at the General Electric Company plant, starting August 7. More than 300 officials of General Electric distributors from all of the 48 states will be in attendance. Gerard Swope, president of General Electric and chairman of the newly formed Industrial Advisory Committee, will be the principal speaker.

◆ RILEY STOKER CORP., Worcester, Mass., announces the relocation of its Pittsburgh office from 1419 Farmers Bank Building to 1420 Investment Building, 239 Fourth Avenue. Van A. Reed, Jr., and L. C. Frohrieb will be in charge of the new office.

◆ Ryerson Personnel Changes

W. F. Kurfess, manager of the mill department of Joseph T. Ryerson & Son, Inc., has been appointed assistant vice president of the company. He has been with the company since 1912. M. J. Hartigan succeeds Mr. Kurfess as manager of the mill department.

R. B. Wilson, sales manager of the St. Louis plant, has been made manager of the St. Louis plant. Mr. Wilson has been with the company for over twenty years.

◆ FOLDING BOX Manufacturers Association of New York has purchased at United States District Court sale the property, plant and equipment of I. and C. Young, Inc. The plant and equipment has been distributed among members of the association.

◆ New Whipcord Transmission Belt

A new belt featuring an endless-wound whipcord construction that is said to have no inelastic stretch is being offered by the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J.

This belt is known as the Condor Whipcord transmission belt and was developed after years of research for high speed, high tension drives which almost invariably require an endless belt.

The Condor Whipcord belt is the continuous-endless-wound type. Its single layer cord section is the equivalent of six duck plies in strength and is many times more flexible.

◆ New Catalogues and Publications

Automatic Transportation Co., Inc., Chicago—Specifications of this company's Models TATF and TGTF tilting fork trucks are set forth in a new folder recently issued. It is claimed that entirely new principles are used in the building of these trucks, providing speed, maneuverability, safety and ease of operation. Illustrations show the trucks in use.

Goulds Pumps, Inc., Seneca Falls, N. Y.—A new bulletin No. 203, features this company's Flexi-Unit Centrifugal Pumps with capacities to 4500 g.p.m., heads up to 350 ft. These pumps are said to be a new development in pump design and to have a wide range of applications. This bulletin explains and illustrates the features of construction, and contains pump selection charts.

Hercules Powder Co., Wilmington, Del.—A publication of merit and fine appearance is a book just received from this company entitled "The Growth of a Modern Hercules." Part I, The Growth of a Modern Hercules, is a story of the company's growth from its inception. Part II, The Labors of a Modern Hercules, takes up chapters on the development of the company's various products and the industries in which they are used. A special section is given over to the company's subsidiary, Paper Makers Chemical Corp., and its products. The book is nicely printed and filled with many fine illustrations.

D. O. James Mfg. Co., Chicago—This company has just published a 48-page catalogue descriptive of spiral bevel gear reducers and spiral bevel gears, giving complete information as to sizes, dimensions, horsepower ratings and prices.

Linde Air Products Co., New York—"Oxwelding for General Maintenance" is a new booklet describing the use of the oxy-acetylene process of welding and cutting in reclamation of broken and worn machine parts, alteration, fabrication and installation of equipment. Among the various plant equipment covered are piping, tanks and containers, machine elements, engine and pump parts, frames and conveying equipment. Repair of worn parts is given special consideration. Among the illustrations is a chart giving thirteen simple tests for identifying the more common metals.

Poole Foundry & Machine Co., Woodberry, Baltimore, Md.—A new reduction gear catalogue describes this company's single, double and triple herringbone gear units. The style of this catalogue is an innovation from the conventional type. All references and technical data for each particular type and size appear on one page which simplifies its use by the reader. This catalogue is 33-RG and may be had from the company upon request.

Roots - Connersville - Wilbraham, Connersville, Ind.—Connersville vacuum pumps, for paper mill suction rolls and flat boxes, are described in bulletin 50-B10 issued by this company. The improved design of this pump and its advantages are set forth in the folder, together with table of sizes and capacities. There are several illustrations and diagrams.

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.—This company has just published a new bulletin entitled Condensing Bleeder Turbines describing the application and construction of these turbines. Three illustrations show representative installations in paper mills. Copies from the Advertising Dept. on request.

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◆ THE FALL MEETING of the Technical Association of the Pulp and Paper Industry will be held at Appleton, Wis., September 26 to 28, 1933, with headquarters at the Conway Hotel. Otto Kress, of the Institute of Paper Chemistry, has been appointed general chairman of the meeting. It has already been announced that the 1934 fall meeting of T. A. P. P. I. will be held in the Pacific Northwest.

◆ THE BABCOCK & WILCOX Tube Company, Beaver Falls, Pa., announces the appointment of T. F. Thornton as sales manager of the Detroit District, with headquarters in the Ford Building, Detroit, Mich. For many years, Mr. Thornton has been connected with the automotive and steel industries, and for the past six years he has had charge of the sale of tubular products of the Pittsburgh Steel Company in the Detroit District.

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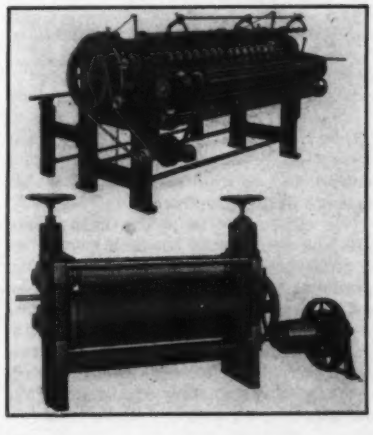
◆ New Paper Converting Machines

Paper Converting Machine Co., Green Bay, Wis., recently added a three-spindle, rapid-roll toilet winder and an embossing machine to its line of paper converting equipment.

The roll toilet winder, equipped with ball bearings and a Horton variable speed clutch, is made in any size up to 84 in. wide. Its perforating blades are



staggered to make for better winding conditions, while the slitting shaft is driven at a speed nine times greater than the speed of the paper to insure a clean cut. Likewise, the machine may be equipped with an automatic stop for any count if desired.

This machine is said to be guaranteed to operate at a speed of 1,200 feet per minute.

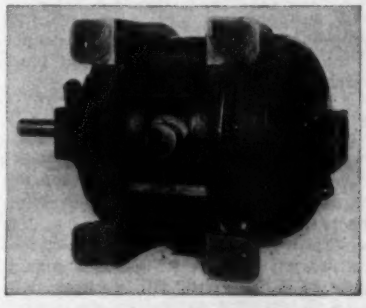
The embossing machine, also equipped with roller bearings, is made in all sizes up to 72 in. wide and is recommended by the manufacturers for use on glassine, table covers, napkin stock, wall papers, etc.

◆ Time Temperature and Time Pressure Controllers

The Bristol Company, Waterbury, Conn., has announced the introduction of new time temperature and time pressure controllers which are suggested for use in processes where it is desired to regulate a temperature (or pressure) at some fixed rate, and then either hold it or decrease it at some other rate. These controllers are designed to function on any range of temperature from —40 to 1000 deg. Fahr. or on pressures from 10 to 2,000 pounds.

◆ Self-Protecting Motors

Thermoguard Motors, having a built-in disc thermostat that functions before the temperature of the insulation reaches the danger point, have been an-



nounced by the Westinghouse Electric & Mfg. Co., East Pittsburgh.

These motors may be arranged at the option of the user, either to be disconnected from the source of power when the temperature approaches the danger zone, or to indicate by giving an audible or visible signal when an unsafe temperature is being approached. On unattended applications, it is possible to arrange the control so that a motor will automatically re-start when it has cooled to a safe operating temperature.

◆ Silent Base for Ventilating Fan

A new ventilating fan, equipped with a so-called floating base, has been built by the Buffalo Forge Company, Buffalo, N. Y. This base was designed to remove the last traces of motor hum which normally is picked up and magnified by the fan base and foundations. Flexible rubber insulators without metal contact between bolts holding down base and fan provide the damping effect.

◆ Spray Coating Machine for Paper Products

Manufacturers of large, flat products such as imitation leather, wall coverings, wall board, floor coverings, black boards, paper, etc., according to a recent announcement, can now spray-finish an average of 200 sq. ft. of material per minute through the use of the new De-Vilbiss Transverse Spray Coating Machine.

This machine is mounted on a structural steel frame built to fit over a conveyor or other equipment used to carry the work through the spray machine.

In operation, a spray gun or battery of guns moves across the material as it passes under the machine. The operation is similar to a hand-operated spray gun, except for the fact that a more uniform coating at a much greater

speed is secured. Hence it effects drastic reductions in coating costs, and at the same time maintains quality.

◆ Laminated Packing

To meet the exacting service of higher steam pressures, the Yarnall-Waring Co., Philadelphia, has developed a new laminated packing for use in Yarway Seatless Blow-off Valves. This packing consists of several stainless steel rings with long fibre asbestos packing between them. At the time of assembly the mass is compressed and heat treated, so that the finished ring is a complete unit suitable for high pressures and temperatures. A very slight clearance is maintained between the metal laminations and the valve plunger.

◆ Instrument to Measure Paper Transparency

An apparatus known as the Weston Trans-O-Meter and suggested for testing the transparency of paper samples, has been announced by Weston Electrical Instrument Corp. It consists principally of a Photronic cell, a rheostat, a lamp, a filter, a microammeter and a glass container. The assembled apparatus has a lamp of 60 watts or under in one end of a box and a Photronic cell in the other end. A tube connects the chamber containing the Photronic cell. This tube has a sliding section through which the substance being measured can be placed into the path of the light rays. The amount of light passing through the sample substance is transformed into electrical energy by the Photronic cell and measured by the microammeter. The cell output may be adjusted by means of the rheostat.

◆ Explosion-Proof Motor

The U. S. Explosion-Proof Motor, a new development of the U. S. Electrical Mfg. Co., Los Angeles, Calif., has two enclosing frames with an unusually large

fan mounted between the two frames. The inner frame completely encloses the electrical windings, stator, rotor, antifriction bearings and bearing chambers, sealing these vital parts against the intrusion of deteriorating substances. The outer frame completely covers and protects the whole unit.

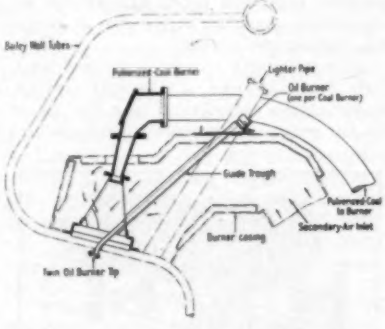
Dust, fumes and foreign matter are air-blasted away from the air passages between the inner shell and the outer frame. The cooling air passing between the two frames does not come in contact with the windings or rotating parts.

The windings of the motor are insulated with asbestos and electrically impregnated with asbestosite. The rotor is of one piece die-cast aluminum, while the inner shell is of cast steel.

The bearing support has an extra long sleeve bushing of graphite bronze which is self-lubricating. The elongation of this bearing support impedes the travel of explosive gases. The terminal chamber is of cast metal which is machine-fitted to the motor frame.

◆ Combination Coal and Oil-Burners for Water-Cooled Furnaces

The Babcock & Wilcox Co., New York, has developed a combination pulverized-coal and oil burner which is claimed to successfully meet the requirements of such an installation in water-cooled furnace walls. Its construction is shown by the accompanying figure from which it will be noticed that the pulverized-



coal burner is the standard B. & W. Multiple Intertube Burner.

The oil burner is of the twin-nozzle type and is inserted between two tubes in front of the pulverized-coal burner, extending back and through the burner casing, supported by a guide trough between the casing and the burner tip. The oil-burner tips are set so that the oil is distributed across the air stream to obtain a satisfactory mixture of fuel and air.

◆ Line of Circuit Breakers

A complete line of small circuit breakers, rated up to 600 volts and 600 amperes, and designed for the control and protection of industrial circuits, has been developed by the General Electric Company.

The new breakers are trip-free from the operating handle and cannot be held in the closed position when an overload exists on the circuit. The *on* and *off* positions are clearly marked on the front cover and a yellow target appears in view when a breaker opens on an overload. No external arc is visible and only the click of the trip mechanism and the appearance of the target indicate that the breaker has tripped.

Overload tripping of the breakers is initiated through a bi-metallic thermal strip which, when heated by over-current, deflects and actuates the trip mechanism. This device has an inherent time lag inversely proportional to the magnitude of the overload. A short circuit will cause almost instantaneous tripping. The large breakers have both thermal time delay and instantaneous tripping, a spring toggle providing sure and speedy operation. All poles of multiple breakers operate simultaneously.

The breaker parts are enclosed in a housing of textolite and provision is made for convenient mounting of the breaker in panelboards, dead-front distribution boards, or individual metal enclosures. All sizes of the breaker, designated as AF-1, are designed to fit the ordinary service entrance box.

◆ New Line of Turbine Pumps

A complete new line of turbine pumps has been announced by Roots-Connersville-Wilbraham, Connersville, Ind. Capacities for these pumps range from 5 to 300 g.p.m. at heads up to 350 ft.

Among the advantages claimed for this line is a patented taper-edge impeller which permits the quantity being pumped to be varied while a pump is running. There is a slight increase in capacity as the head falls, with a noticeable decrease in the power consumption. The taper edge impeller may be adjusted to give volume required at lower heads while taking full advantage of savings in power consumed.

Suction and discharge openings are both located in the main pump housing, thus facilitating disassembly for cleaning without disturbing the pipe connections.

Other features of the design, along with a performance curve, table of capacities, and pump cross sections, are included in Bulletin 260-B10.

◆ Splash-Proof Motor

Century Electric Company, St. Louis, Mo., has just announced the completion of a line of splashproof motors from 1 to 30 h.p. While primarily intended for

the typical splashproof installation, the announcement recommends the line for outdoor installations where protective buildings or covers are not available. The frame and end brackets are of refined grey iron castings. One way ventilation is provided by intake and outlet openings in the lower section of the end brackets. The bearing bracket is fitted to the frame by long contact sealed fit. Cartridge type grease lubricated ball bearings are used on all sizes.

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Lubrication of Stokers Is Important

Modern stoker equipment is quite rugged and also is reliable but should be given careful attention, since the operating parts are subjected to severe service conditions.

Stoker gears should be protected from dust and should be cleaned and lubricated regularly. Wear can be materially reduced by keeping all accessible bearing and sliding surfaces well greased even where no special provision is made for lubrication. The stoker engine (or turbine or motor) and the drive should be protected from dust as fully as possible and be kept well lubricated.

Most manufacturers have succeeded in making their designs such as links, bars and other rapidly wearing parts, especially those which are close to the fire, easily replaceable and operators usually keep extra parts on hand.

When overhauling, the stoker should be put in the best condition possible by cleaning and by replacing parts showing unusual wear. All supports, shafts and other parts should be examined for alignment and straightened, if necessary. All air ducts and windboxes should be examined for leakage.

◆ High Temperatures Hard on Valves

For high-pressure, superheated steam, steel-body gate valves with complete monel metal trim seem to be the standard. Even with these valves, certain troubles are experienced when temperatures are around 700 deg. Fahr., one of which is the cutting through of the steam between the seat rings and valve body. Another is leakage at the connection of the bypass to the main valve body, due to the expansion resulting from these extremely high temperatures. In some cases, there has been leakage of steam through the bodies of these valves after they have been put in service. This has brought out the suggestion that they be tested with superheated steam before installing, since the hydraulic test seems to fail in this regard.

Careful attention should be given to packing, which should be inspected frequently. If leaky packing cannot be made tight by a moderate amount of screwing up, it should be renewed at once. The need for renewal of packing is not always indicated by leaking but the position of the packing nut or packing sleeve will often indicate the need of new packing. It is best to follow the advice of the manufacturers in the choice of material for packing.

Choose valves with a generous packing space, especially in the matter of depth—which means a given tightness for less pressure—and with a non-turning gland, if possible. Nuts on packing studs should be tightened evenly to avoid binding on the stem.

◆ Cleaning Condensers

Within recent years, the objections which many engineers had to feeding chemicals into condensers for the purpose of removing scale have been largely overcome. The chemicals used depend upon the nature of the deposits. Caustic soda is best for deposits of grease or mud. A one per cent solution (1-lb. caustic to each 100 lb. or 10 gal. of water) should be used at first and then gradually increasing to a maximum of 7 per cent.

For scale composed mostly of sulphate or carbonate of lime or magnesia, a dilute solution of hydrochloric acid is most suitable. A 5 per cent solution may be used at first and the strength increased in severe cases to a maximum of 40 per cent. In using these solutions, close off the inlet and discharge valves to the water space of the condenser and provide ample vents on both ends so as to allow the gases to pass off and also to prevent the accumulation of pressure. A steam connection should be provided at the bottom. Allow the chemicals to run in slowly from a barrel above until the condenser is full and then turn on steam enough to cause the solution to boil slowly. In this manner, a condenser can be cleaned in from 6 to 8 hours.

◆ Back-Pressure Valves

Back-pressure and atmospheric-relief valves, which serve primarily as safety valves on exhaust-steam-heating and engine-and-turbine atmospheric-exhaust lines, are of three general types: single, double or balanced, and multiple for horizontal or vertical mounting. The single-seated valve is best for diameters up to 6 in.; for larger sizes balanced and multiple valves are more suitable. When used in connection with condensing engines and turbines, these valves are frequently water sealed, a ½-in. connection supplying all the necessary water for such service.

Atmospheric exhaust lines used in connection with engines and turbines should always be installed vertical and the relief valve used in connection therewith may be 1 or 2 in. less in diameter than this line, a 14-in. valve being suitable for a 16-in. line a 12-in. valve for a 14-in. line, etc.

◆ Flat Disc Water Valves

The flat disc is by far the most commonly used water valve in reciprocating pumps. The disc of the valve is usually made of rubber, a soft quality for vacuum and pressures up to 75 lb., hard rubber for 75 to 150 lb., specially hard vulcanized rubber up to 300 lb., and metal discs for pressures higher than 300 lb. per sq. in. Metal is usually used for hot water for all pressures.

It is customary to fit a metal cap over composition valves to keep them from warping and to take the bearing pressure of the spring. Both faces of composition discs may be used. Seats are usually made of bronze or gun metal, forced or screwed into the "deck," so as to be renewed, if necessary.

Valves are most commonly set to rise ¼ in. The higher a valve rises from its seat, the longer will be the time required for it to seat, and the greater will be the slip. On the other hand, the higher the lift, the freer the opening. The springs must not be sufficiently heavy to add materially to the resistance of the valve by restricting the flow, yet should serve their purpose of closing the valve quickly and thus reducing slip. With the springs, passages and life as ordinarily arranged, the loss in pressure through disc valves is about ½ lb. or 1.15 ft. of head.

◆ IF THE GOVERNOR belt should break, will your engine stop? If you do not know this to be the case, see to the adjustment of the safety cams on the Corliss engine and to the automatic stops on other types of engines, and make sure that they are adjusted to operate. They are likely to get out of their proper position and should be examined at least once a week, and tested to see if they will control the engine.

◆ AFTER REMOVING loose dirt with a stiff brush, files can be cleaned of grease by boiling them for about 45 minutes in a solution consisting of ¼ lb. of saleratus to a quart of water. The files are then thoroughly washed in clean water and dried and placed on end, completely submerged in a solution consisting of ¼ lb. of sulphuric acid to a quart of water. After remaining in the acid solution for about 12 hrs. the files should be thoroughly washed in clean water, quickly dried and given a light coating of kerosene or other thin oil to prevent rusting.

Code of Fair Competition

of American Paper and Pulp Industry

UNDER date of July 1, the following letter by Sidney L. Willson, president of the American Paper and Pulp Association, was addressed to all associations of primary manufacture within the industry. The Code of Fair Competition referred to in President Willson's letter is hereinafter quoted *in toto*.

"Enclosed is a preliminary draft of the general Code for the paper and pulp industry. This Code is designed to cover the broad phases, labor and competitive conditions in the primary manufacture of paper, pulp and paper board. It relates particularly to that part of the industry that operates upon a continuous basis.

"The Committee that assisted in the preparation of this draft felt that the establishment of a wage base for the industry required very careful consideration on the part of the groups, and that this Association should furnish whatever information it had to the group associations which, together with their own data, would assist them in arriving at recommendations. The information available in this office is being prepared and will be forwarded to you in the near future.

"In considering wage rates, it is important to bear in mind that probably there will have to be a balance between the adjustment in this industry and other major industries. In addition, in the consideration of covering by price adjustments any wage level that may be agreed upon there must also be considered the effect upon paper consumption and in the facilities of the industry and the resultant effect of these elements upon employment in the industry. The fact that basic wages in such industries as the steel industry and other key groups, have not been established as yet, makes this question one of vital importance.

"I would appreciate having your recommendations as to wage rates and as to the other provisions of this Code within the next ten days. When these recommendations are received, the Committee that worked upon the preparation of this Code will consider all suggestions for submission at a meeting of the group chairmen for their final action.

"I am also enclosing a tentative draft of the Constitution and By-Laws of the reorganized Association. I would like your suggestions upon these also preparatory to submission to the group chairmen for action."

GENERAL CODE OF FAIR COMPETITION

These provisions are established as a Code of Fair Competition for the branches of the paper, paper board and pulp industry set forth in this paragraph (said branches being hereinafter collectively referred to as the "industry"), namely: _____, _____, _____.

This Code shall become effective for the industry the second Monday after the date upon which it shall be approved by the President of the United States.

After the effective date hereof, the associations whose names are subscribed hereto, and their respective members, agree to conduct their individual businesses within the field of the industry pursuant to the provisions of this Code.

ARTICLE I—Employment

1—The minimum wage to be paid by employers in the industry to common labor, except apprentices, cleaners, outside labor, watchmen and semi-pensioners, in mill production operation, shall be—

(a) Northern Zone, which shall consist of all of the territory of the United States except the states named in subdivisions (b) and (c).

Male labor_____cents per hour.
Female labor_____cents per hour.

(b) Central Zone, which shall consist of the states of Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee and North Carolina, and the District of Columbia.

Male labor_____cents per hour.
Female labor_____cents per hour.

(c) Southern Zone, which shall consist of the states of South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Texas.

Male labor_____cents per hour.
Female labor_____cents per hour.

2—The maximum hours of labor for any employee paid on any hourly or piecework basis, engaged in mill production operations in the industry, except those employes in an executive or supervisory capacity or as watchmen, shall be eight hours per day, subject, however, to the following exceptions:

(a) Workers may be employed without regard for the provisions of this Code when necessary to protect property in case of fire, flood or other acts of God, or any emergency repairs.

(b) The time of workers spent in wash-ups, changing wires and machine clothing, or otherwise, while the mill (or the machinery in connection with which such workers are regularly employed) is not operating shall not be included in the permissible maximum hours of such workers.

(c) If, in order to comply with the provisions of this Code, with respect to maximum hours it shall be necessary for any mill to go from a two to a three hour basis in machine operation, such mill shall have ninety (90) days after the effective date of this Code as a training period during which it shall be exempt from the above requirement as to maximum hours of employment with respect to the operation in question. Any individual mill may also be exempted from the above requirement as to maximum hours of labor to such extent and for such limited period as may be necessary to train additional employees in order to comply therewith or as may be necessary as a result of a local housing shortage, making it impossible to procure the additional labor necessary to comply with such maximum hours, provided that in any such case proof of such condition shall be furnished to the Executive Committee of the group or divisional association within whose jurisdiction the product of such mill shall fall.

3—Employees engaged in work of a character heretofore customarily paid for on an hourly or piecework basis in the industry shall not be exempted from the provisions of this Code with respect to maximum hours of labor by transferring such employees to a weekly or monthly payment basis.

4—All employees in the industry shall have the right to organize and bargain collectively through representatives of their own choosing and shall be free from interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection.

5—No employee in the industry and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing.

6—All employers in the industry shall comply with the maximum hours of labor, minimum rates of pay and other conditions of employment approved or prescribed for the industry by the President of the United States.

ARTICLE II—Production Control

1—It shall be a purpose of this Code to equalize production with demand. It is the intention of the American Paper and Pulp Association and of the divisional associations connected therewith to formulate detailed plans to accomplish such equalization.

2—Pending the adoption and approval of such plans, no

manufacturer shall operate in any field of manufacture covered by this Code at a greater ratio than is sufficient to maintain its stocks of products manufactured for sale (after current shipments on bona fide orders) at a level not exceeding an amount equal in tonnage to the average of such of its stocks on the first day of the corresponding month during the years 1926 to 1929, inclusive, with due allowance for new capacity.

3—There shall be no increase in productive capacity with respect to products manufactured for sale falling within the field of this Code by installing new or additional paper or paper board machines or pulp digesters or grinders, nor shall any manufacturer shift the production of an existing paper or paper board machine to another product of the industry then being made by others but not theretofore manufactured by such manufacturer without (a) ten (10) days' notice to the Executive Committee of the association of the group or division of the industry covering the product for the production of which it is intended to install such machine or to which such machine is to be shifted, and (b) a license therefore from the President of the United States.

This paragraph shall cease to be in operation as to any product falling within the field of this Code whenever the shipments of such product for a period of six (6) consecutive months shall equal ninety (90%) per cent of the existing practical operating capacity for the production of such product, as determined by the Executive Committee of the group affected.

ARTICLE III—Conditions of Sale

1—The selling of any product except rejected or damaged merchandise or "seconds" and except in fulfillment of bona fide contracts existing June 16, 1933, below the average weighted cost as determined on the basis of uniform principles of accounting shall constitute unfair competition. "Cost" is defined as including all cost to the time of delivery to the buyer, including among other items all materials, waste and broke, cost of rejections allowances and seconds, labor and overhead costs as well as all charges, such as interest on capital invested, salesmen's, and agents' or brokers' commission, depreciation, depletion, obsolescence, and proper reserves. Rejected or damaged merchandise and "seconds" shall be sold on such uniform discount basis as may be established as customary by the group association within whose jurisdiction such product falls.

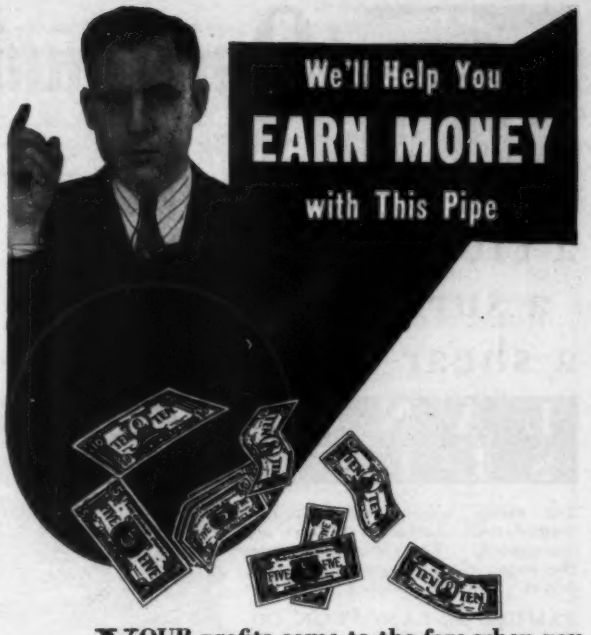
2—Basic principles for a comparative and uniform accounting will be adopted by the association as soon as practicable, and when adopted will be used as the basis of determining minimum prices. To facilitate the determination and adoption of such uniform accounting, the members of the industry shall supply to the Executive Committee of the American Paper and Pulp Association such information as may be called for by such association, subject to such regulations with respect thereto as shall be prescribed by the President of the United States.

3—Pending the adoption of such uniform accounting, the minimum selling prices of the principal products of the industry of the standard grades and weights shall be determined by the group or divisional associations, based on present knowledge of costs, and shall be set forth as a part of the subordinate codes to be presented by them.

4—The standard unit and sales basis, regular stock weights, sizes and substance numbers, making orders, finishing charges, wrapping and packing deductions or charges, color charges, and variations in quantity, weights, cores, waste, marking, shipping date, claims and terms, and all price differentials between products, quantities, qualities, or classes of customers, shall be governed as to each field of the industry by the trade customs of the group association having to do with said field which have heretofore been adopted or may hereafter be adopted (subject to the approval of the President).

5—Distributors, agents, brokers and other wholesale agencies and importers shall observe the minimum mill or minimum resale prices, if any, prevailing at the time of such sale, as determined by the character of the sale and as embodied in the subordinate codes of fair competition of the respective branches of the industry, and shall also be subject to the Trade Customs of the respective branches of the industry.

6—The making of incomplete, ambiguous and deceptive



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contracts provides a medium for making unfair and discriminatory prices, induces fraud and repudiation thereof, gives rise to disputes and disturbs stability in business operations and it is, therefore, declared that all contracts for the sale of products falling within the field of this Code shall contain a definite and true statement of the product covered, price, quantity, terms of payment, place of delivery, date, name of purchaser and all other items necessary to form a complete contract, and that all contracts so entered into shall be in conformity with this Code and performed in letter and spirit. It is further declared that in order to carry out the foregoing, all invoices shall contain a full statement of all facts necessary to make such invoice a full and complete record of the transaction represented on the face thereof, and such invoices and all books of record pertaining thereto shall be available at all times to such authorized officers or agents of the group association within whose scope the product covered by such contract shall fall, or to an authorized accounting firm as may be determined by such association. Until submission and approval of the subordinate codes of fair competition of the respective branches of the industry, no manufacturer in the industry shall quote on any contract prior to thirty (30) days before the first delivery thereunder nor make such quotation at a fixed price for a period longer than ninety (90) days from date of quotation, and all quotations shall be for acceptance within not to exceed ten (10) days; and all contracts shall provide for price revision at least every three (3) months.

7—The following are declared to be unfair trade practices and are prohibited:

(a) The selling of goods below cost;
(b) Discrimination in price;
(c) Secret rebates;
(d) Mismarking, misbranding or misrepresentation of goods;
(e) Commercial bribery;
(f) Inducing breach of contract;
(g) False disparagements of competitors;
(h) Enticement of competitor's employees;
(i) Deliveries not conforming to sample or order;
(j) Blanket contracts;
(k) Contracts lacking mutuality;
(l) Special sales at a reduced price;
(m) Changing terms of contract;
(n) Deviations from standards;
(o) Dumping of surplus products;
(p) Making of false reports;
(q) Guarantee to sell below competitors' published or known price,

all as more specifically set forth in Exhibit_____hereto annexed.

8—The following are declared to be fair methods of competition and are hereby approved:

(a) The open publication of price lists and adherence thereto;
(b) Adherence to uniform contracts,

all as more specifically detailed in Exhibit_____hereto annexed.

9—The basis of quotations, whether f.o.b. mill or delivered, or otherwise, and freight or cartage allowances, zoning or the establishment of uniform quotations within zones and the standard of trade terms and cash discounts, shall be determined by the respective branches of the industry and included in their respective codes of fair competition.

10—Bona fide export sales shall be exempt from the provisions of this Article.

ARTICLE IV—General Conditions

1—Every contract, acknowledgment of order, and invoice with respect to sale of products falling within the field of this Code, shall contain a statement that the transaction covered thereby, and all terms and conditions thereof are in accordance with this Code.

2—Any and all amendments or alterations in or additions to this Code proposed by the industry shall require adoption by the vote of the membership of the American Paper and Pulp Association in accordance with its By-Laws, before the same shall be presented for the approval of the President of the United States.

3—In the manufacture of paper, paper board and pulp, as

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to any product with respect to which foreign imports exceed ten (10%) per cent of the domestic consumption, the provisions of this Code shall not apply until protective regulation of such imports shall be established, pursuant to the provisions of Section 3 (e) of the National Industrial Recovery Act.

4—It is an express provision of this Code that the President of the United States may from time to time cancel or modify any order, approval, license, rule or regulation issued under the terms of the Industrial Recovery Act, or any of the provisions of this Code.

The Paper Industry Safety Contest

July 1, 1932, to June 30, 1933
Scores as of May 31, 1933
13 Mills Still in Race

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B	Fraser Companies, Ltd.	Fraser Paper, Ltd.	Madawaska, Me.
GROUP C	St. Croix Paper Co.	Woodland	Maine
	Cornell Wood Products Co.	Cornell	Wisconsin
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	Consolidated Water Power & Paper Co.	Biron	Wisconsin
	International Paper Co.	Livermore Falls	Maine
GROUP D	Port Huron Sulphite & Paper Co.	Sulphite	Port Huron, Mich.
	U. S. Gypsum Co.	No. Kansas City	Missouri
	International Paper Co.	Riley	Maine
	U. S. Gypsum Co.	Gypsum	Ohio

Division II—Remanufacturing

Kimberly-Clark Cor.	Atlas	Appleton, Wis.
Container Corp. of America	Natick	Massachusetts
Bemis Bro. Bag Co.	E. Pepperell	Massachusetts

IMPERFECT SCORES—Division I

	Key	Rank	Points Credit	Points Debit
GROUP A	PA- 2	1	960.064	
	PA-11	2	754.688	
	PA- 6	3	750.688	
	PA- 9	4	710.816	
	PA- 7	5	444.224	
	PA-14	6	384.960	
	PA-13	7	222.916	
	PB- 6	8		429.840
	PA- 8	9		1,528.768
	PA- 5	10		4,876.112
GROUP B	PA- 1	2	919.616	
	PB-21	3	898.608	
	PC- 8	4	800.288	
	PB- 5	5	764.496	
	PB-14	6	723.904	
	PB-18	7	707.104	
	PA- 3	8	693.760	
	PB-22	9	636.096	
	PA-12	10	521.696	
	PB-20	11	362.272	
	PB-19	12	342.784	
	PB- 1	13	221.008	
	PB-12	14		261.104
	PB-13	15		393.256
	PB-15	16		609.920
	PA-10	17		2,086.592
	PB- 3	18		2,173.360
	PB-17	19		2,541.688
	PB- 2	20		3,476.784
GROUP C	PC-20	6	817.632	
	PC-24	7	779.776	
	PB-16	8	743.344	
	PB-10	9	639.984	
	PC-15	10	626.352	
	PC-25	11	610.144	
	PC- 9	12	601.968	
	PD- 5	13	570.464	
	PC-17	14	508.384	
	PC-19	15	483.168	
	PC-13	16	354.720	
	PD-11	17		31.616
	PC-14	18		198.432
	PC-23	19		415.488
	PC- 7	20		621.136
	PC-22	21		914.528
	PB- 9	22		1,417.104
	PC-10	23		4,078.112
	PC-18	24		6,526.592
GROUP D	PD-12	5	876.192	
	PD- 8	6	744.560	
	PD-16	7	731.024	
	PD- 7	8	706.480	
	PC- 4	9	689.104	
	PD- 3	10	577.376	
	PD- 2	11	350.848	
	PD-14	12	206.240	
	PD-23	13		9.040
	PD- 1	14		273.056
	PD-10	15		277.696
	PD-13	16		398.912
	PD-15	17		416.896
	PD-20	18		611.184
	PC-21	19		633.632
	PD- 4	20		1,000.224
	PD- 9	21		4,246.000
	PD-21	22		8,563.168

DIVISION II

RD-1	4	736.144	
RD-3	5	610.928	
RB-3	6	572.000	
RB-1	7	505.808	
RC-1	8	502.784	
RD-6	9	131.408	
RC-3	10	117.648	
RD-7	11		95.968
RA-1	12		253.296
RB-2	13		327.040

Withdrawn: PA-4; PB-7, 8; PC-5, 16, 26.
No May Report: PC-2
No April or May Report: PC-1 and 6.

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°U. S. PAT. 1898707

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4. Includes all the best scientific principles of Beaters, Jordans, Rod Mills, Ball Mills, Centrifugal Separators, and Pumps.
5. Takes the place of Beaters, Jordans, Paper Machine Screens, Centrifugal Separators, and Pumps.
6. Built in sizes having capacity up to 75 tons daily.
7. Hydrates by squeezing the water into the fibres, between rolls under tremendous pressure, without cutting the fibres short.
8. Hydrates the fibres under pressure and vacuum with all degrees of pressure between great pressure and vacuum.
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11. Power savings repay every few months the cost of APMEW Automatic Continuous Beater Process.
12. Process is easily controlled and much simpler than beater process.
13. The three APMEW Machines can be driven by low cost motors of 1,800 RPM.

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1864 *The Qualifications of* **1933**

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TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Effect of Beating on Fibrous Cellulose

General phenomena of the beating process are discussed. Drainage properties of suspensions of beaten fibers were determined in the apparatus shown in Figure 1. Drainage takes place through a bronze wire cloth between circular rubber washers. The collecting cone is of brass and has an air vent capable of being closed by a plug. The object is to refilter the drainage water through the pulp cake on the wire until all the fibers are deposited on the cake, and then to measure the drainage rate under standard conditions, commencing with 600 cc. of water in the container, and measuring the time to drain off 250 cc. of water. Details are given of various precautions that must be taken in this method. Many of the results obtained by the methods of drainage, electro-kinetic potential and surface conductance do not accord with those obtained from cohesion and strength tests. It is claimed

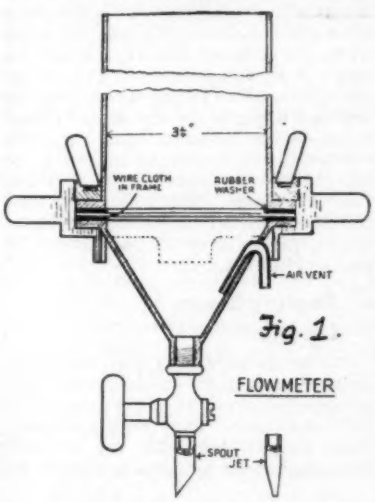
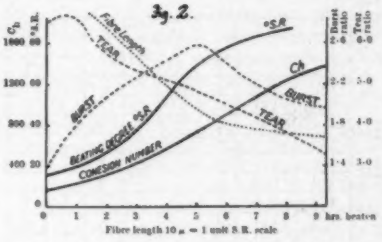


Fig. 1.

that the term "hydration" has been applied far too loosely in describing the phenomena of beating. There is hardly any evidence to show that the beaten cellulose fibers bind more water than the unbeaten fibers. A fuller knowledge of the changes in specific surface which take place during the beating process would demonstrate just how much water might be expected to be held by the fibers as an oriented film. Three important conclusions were obtained from the experiments on beating and sheet formation. Mechanical action of beating is essential to the development of the cohesion property. Bruising or grinding is more efficient than cutting. Dry reduction, or beating in a non-aqueous liquid, can produce the effect to some extent. Cohesion and strength properties diminish greatly when the beaten fiber is immersed in a dehydrating or in a neutral liquid. The process is rapidly reversible. Non-cellulose fibers show neither cohesion nor sheet strength. Curves, obtained for beating test carried



out in a laboratory beater with fairly sharp bronze knives and a 2.75 per cent pulp concentration, are shown in Figure 2. The theory developed is that, inasmuch as the phenomena are specific to water, a chain of oriented water molecules link the active hydroxyls of the cohering cellulose miscelles in such a way that the strength of cohesion depends on the shortness of the chain. J. H. B. Bell, Journal of Society of Chemical Industry, 1933, 109-116T; 119-130T.

◆ Decomposition of Grasses

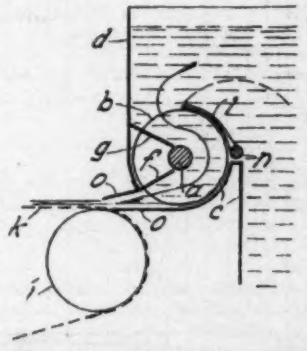
The highest yields of cellulose are obtained from esparto and from wheat straw by boiling with sodium sulphite, all of the ash and much of the pentosans being retained. When the liquor is alkaline or acid the ash or the pentosans, respectively, are attacked. The consumption of sulphite increases with the quantity taken. Straw is disintegrated after boiling for two hours with sodium sulphite, but esparto requires three to four hours on account of its hard, waxy epidermis. With aqueous sodium hydroxide disintegration is much more rapid and long boiling darkens the cellulose and raises the bleach number. S. Hilpert, A. Wolter and H. Hofmeister. Cellulosecehmie, volume 14, 1933, pages 33 to 40.

◆ pH of Liquor in Sulphite Process

Acidity of the sulphite liquor is determined by the speed of saccharification of soluble starch with and without the addition of salt at 110 to 120 degrees C. The acidity of sulphur dioxide solutions of technical strength is fully sufficient to hydrolyze polymerized carbohydrates, such as starches, into simple sugars. Experiments were also made with calcium bisulphite digestion liquor and waste liquors. The hydrogen ion concentration first decreased during digestion and then rose over the initial pH value. This phenomenon is sharply accentuated in digestion liquors containing little lime, particularly with regards to increase of the hydrogen ion concentration. The decrease in the pH value observed at the beginning of digestion is undoubtedly connected with the absorption of sulphur dioxide by the wood without the lime being combined therewith in the same degree. It can be easily assumed that the hydrogen ions diffuse into the wood with greater speed than all the other ions and carry along with them the bisulphite ions. The calcium ions penetrate the wood more slowly and probably in greater measure after the formation of lignosulphonic acid. The hydrolyzing power of lignosulphonic acids as regards starch was also determined. The conclusion reached was that the activity of the lignosulphonic acids must be the same as that of strong mineral acids. E. Haegglund. Svensk Papp. Tidn., volume 35, pages 475ff.

◆ Flow Control to Fourdrinier and Cylinder Wires

The new apparatus, as shown in the accompanying illustration, consists of the shaft (a) on which are fastened, concentrically and at right angles thereto, a number of discs (b), which are arranged not too far apart and in sufficient number to extend across the width of the outlet channel (c). The shaft (a) with the discs (b) is arranged at right angles to the direction of flow of the stock in front of the outflow sluice (o). The latter is found direct above the breast roll (l) and the wire



(k). The rods (f) and (g) are for damming and controlling the flow of stock and are connected to the wall (d) or to the wall of the channel (c). These rods are about as thick as the distance

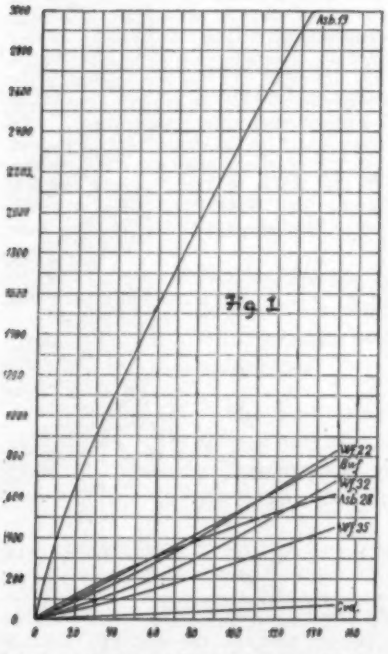
separating the discs (b), so that they fit into these spaces and almost stop the flow of stock through them. The arrangement and form of the rods (f) and (g) are such that the shaft (a) lies either directly above or at the edge of the flow profile. The flow of stock to the regulating device and especially the overflow of stock from this device into the mouth of the outflow sluice are controlled thereby. Max Wenzel, Neidhardtsthal, Germany. German Patent No. 564,555.

◆ Sulphite Cellulose

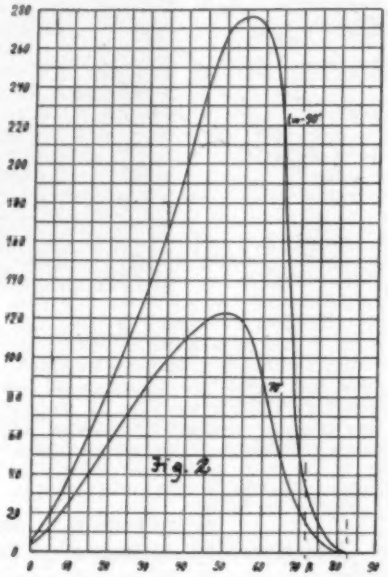
The feature of the new process is that it enables the circumvention of unfavorable reactions during the digestion of pulp to a greater degree than heretofore. The result is that the wood is more completely digested and the progress of digestion is more rapid. To this end the digestion is carried out in two stages in such a manner that the raw material is first preliminarily cooked with a solution of alkali bisulphite or with a mixture of alkali bisulphites and alkali sulphites which are neutral or have an acid reaction. These solutions do not contain any additional sulphurous acid. Then the digestion is carried out to a finish with sulphite, to which the sufficient quantity of free sulphur dioxide has been added. Patentaktiebolaget Groendal-Ramen, Stockholm, Sweden. German Patent No. 564,738.

◆ Removal of Water From Paper

A detailed study was made of the conditions surrounding the removal of water from the moist paper web in contact with drying cylinders covered with



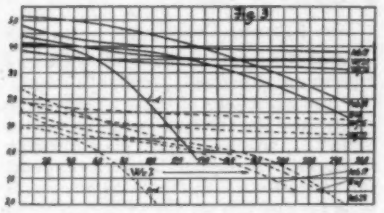
felt in the papermaking machine. Measure for varying water content of the felts used is the number of cubic centimeters of water in 100 cc. of felt. This is called Wv and is equal to Vw/V.100, wherein Vw is the volume of water in the volume of felt V. Experimental results on felts containing ten per cent moisture are shown in Figure 1, the curves representing various felts as follows: Asb 19 and Asb 28 being asbestos felts with 1900 and 2800 grams per square meter; Wf 22, Wf 32 and Wf 35 being felts made of wool with 2200, 3200 and 3500 grams per square meter; Bwf being a cotton felt and Cvd being sailcloth. The air penetrability (cu.m.lsq.-m./hour is plotted as ordinates and the pressure as abscissae in kilograms per square meter. In the case of sailcloth the pressure rises linearly with the air penetrability; in the case of asbestos felt the pressure rises more sharply than linearly with the air penetrability; in the case of the woolen felts the pressure



rises less sharply than linearly with the air penetrability.

Measurements were also made of the diameter of the pores of the felt. The asbestos felt (1900) had the largest pores and the sailcloth had the smallest. Capacity of the felt to absorb water from the paper web depends on the ease with which the water rises out of the felt into the fine pores of the fabric. The mechanism of this process is studied carefully. Results of experiments obtained with wool felt, 2200 grams per square meter, are shown in Figure 2. The water absorbing capacity of the felt, expressed in kilograms per square meter-hour, is plotted as ordinates and the water content of the felt, Wv, is plotted as abscissae. The temperature of the water, tw is 70 deg. C. and 90 deg. C., giving two curves as shown. The curves show a gradual increase in the water absorbing capacity of the felt as the water content of the felt increases until a maximum is reached at a water content of forty per cent and then the water absorbing capacity of the felt decreases gradually. This shows the poor wetting properties of wool, for the capillaries in the woolen texture must first be wetted with water before they can absorb water. On the other hand, the asbestos felt absorbs water immediately but the cotton felt has a longer period of wetting.

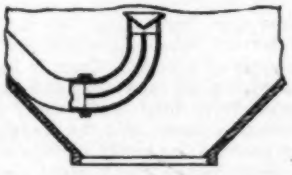
An experimental model was built to duplicate practical conditions wherein the paper web is pressed against the felt-covered cylinders. Many results were obtained and some are plotted as shown in Figure 3. The water content of the felt, wV, is plotted as abscissae in volume per cent and the water given



up by the web per square meter of surface per hour is plotted as ordinates. The water content of the paper was 41.2 per cent, the average paper temperature 88 deg. C., the speed of the paper web in the machine 198 meters per minute, the air temperature 40 deg. C. and the relative humidity of the air, corresponding to a partial pressure of the moisture in the air equal to 9.21 mm., was 16.8 per cent. There is no agreement between the water given up by the paper and the water absorbed by the felt, the latter being often smaller than the former. The difference represents loss by evaporation. The dotted line curves represent the water absorbed by the felt and hence when the ordinate distance for any abscissa from the horizontal axis to the dotted line curve is subtracted from the ordinate distance for the same abscissa to the corresponding full line curve, the difference will represent the water removed by evaporation. Dr. W. Mull. Der Papierfabrikant, 1933, volume 30, number 49, number 50, pages 725 to 729, number 51, pages 737 to 742 and number 52, pages 749 to 751.

◆ Feeding Liquor to Digesters

The device shown in the accompanying illustration is of the injector type and is used for the charging of digestion liquor into digesters. The feeding arrangement is provided with one or more atomizing cones which are fixed to the

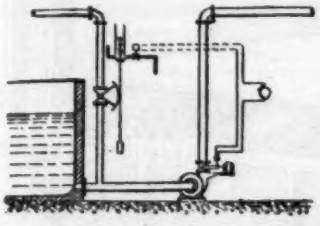


end of the curved feed pipe. The purpose of this is to distribute the liquor uniformly throughout the digester. The curved portion of the feed pipe is provided with one or more direction plates or pipes, which have for their purpose the homogeneous distribution of the

liquor, so that the cones are effective in obtaining perfect atomization of the liquor and wetting of the stock uniformly throughout the entire digester. Aktiebolaget Karlstadt Mekaniska Verkstad. Swedish Patent No. 71,512, filed May 2, 1929.

◆ Controlling Concentration of Suspensions

The illustration shows an apparatus which is used for the control of the concentration of substances in suspension in liquids by means of agitation. This



applies particularly to the suspension of pulp fibers in water used for feeding the paper machine. The substance, whose concentration it is desired to control, is caused to move in a forward rotary direction and it is thus forced to actuate through this movement a regulating device. In the case of high concentrations of the suspended substance, this is accomplished by direct impact, and when the concentrations are low, by impact through rotation. The regulating device itself acts on the elements that control the concentration of the mixture. T. Kaelle. Swedish Patent No. 71,513, filed March 3, 1928.

◆ Sulphite Pulp Waste Liquors

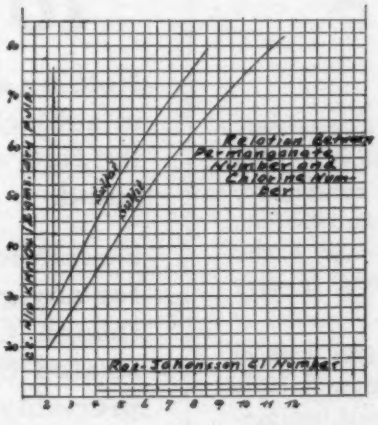
A process is described for the production of waste liquors with a high content of organic substances in the digestion of sulphite pulp. After predigestion with a solution of an alkali bisulphite and/or monosulphite at a temperature and pressure which are sufficient to cause chemical combination between the salts and the incrustating substances, the cellulosic material is subsequently digested with a solution containing waste liquors or wash water from a previous treatment of the pulp, together with free sulphur dioxide. Patentaktieb Groendal-Ramen. British Patent No. 389,218, filed January 1, 1932.

◆ Tests on Forced Circulation Digestion

In the Brobeck system, the digestion temperature was uniform throughout at a speed of flow of liquor of 16 cubic meters per minute, this in spite of the fact that the digestion in the lower part of the digester progresses farther than in the upper part. The reverse condition arises when the speed of flow is five cubic meters per minute. An average speed of flow of ten cubic meters per minute gives uniformly digested stock in spite of variation of temperature in the digester. The somewhat higher temperature in the upper part of the digester compensates for the greater reaction speed in the lower part of the digester. In the Schauffelberger system the liquor circulates from bottom to top. Dense packing together of the wood chips and increased resistance to flow of the liquor are avoided in this system. Increase of the total sulphur dioxide concentration in the digestion liquor, for example, from 4.2 to 8.0 per cent, increases the yield of pulp from 52 to 60 per cent. The only difficulty arises from the high digestion pressure. To overcome this the wood may be impregnated first with strong digestion acid and then cooked to a finish with lower concentrated acid. E. Haegglund. Tekn. Tidskrift, volume 62, pages 49ff.

◆ Determining Degree of Digestion of Sulphite and Sulphate Pulp

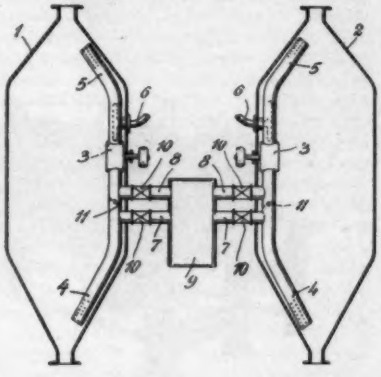
A method has been worked out, based on the use of standard tenth normal solution of potassium permanganate for determining the degree of digestion of sulphite and sulphate pulp and is claimed to be useful for this purpose with the exception of easy-bleaching pulp. One gram of the absolutely dry pulp, equivalent to 1.09 gram of the air-dry pulp, is placed in a 750 cc. beaker, 180 cc. of distilled water and 20 cc. of sulphuric acid are added and the contents mixed with the aid of a T-shaped mechanical agitator made of



acid-resistant steel, revolving at 500 R.P.M. Then 50 cc. of tenth normal potassium permanganate solution are added at one time. The reaction temperature is 20 degrees C and the agitation lasts five minutes exactly. Then the reaction is stopped by the addition of 50 cc. of tenth normal solution of ferrous-ammonium sulphate, containing 100 cc. of concentrated sulphuric acid per liter. After the solution becomes colorless, agitation is stopped and the pulp is allowed to settle. The clear liquid is decanted after two minutes, filtered through a glass filter when necessary and 150 cc. of the solution are titrated with tenth normal solution of potassium permanganate until a color change ensues. The consumption of potassium permanganate, calculated on the basis of two grams of the original dry pulp, is then used in the accompanying chart to obtain the chlorine number according to Roe-Johansson. This method enables the chlorine number to be determined with an accuracy of 0.1 to 0.2 unit without the need of using a special chlorine determination apparatus. D. Johansson, Svensk Pappers Tidning, volume 35, pages 478ff.

◆ Pulp Digester

Two digesters are shown in the accompanying illustration in which the digestion liquor is circulated by means of a circulating pump. The digesters (1) and (2) are each provided with a circulating pump (3) located within the digester. Each pump is connected with a suction line (4) and a pressure line (5). A pipe (6) is provided in the pressure line for blowing in steam, and each suction line (4) is connected with an inlet pipe (7) and an outlet pipe (8)



leading to the common heater (9), which serves both digesters. The lines (7) and (8) are each provided with a valve (10) and the suction line (4) is provided with a valve (11) in each case, this valve being located between the junction of the respective suction lines and pressure lines. When the digesters are to be operated by direct heating, then the valves (11) are opened and the valves (10) and are simultaneously closed, so that the heater is shunted out of the circuit. When the valves (11) are opened partially or entirely, and the valves (10) are similarly closed partially or entirely, a smaller or larger quantity of the digestion liquor is forced to flow through the heater (9). The digesters are then operated partially or entirely with indirect heating. When the installation is to be operated with indirect heating, then the heater is first connected with the digester (1) by opening the valve (10) and closing the valve (11), whereby at the same time the valve (1) on the other side of the heater is closed. After the heating period has elapsed, the valve (11) of digester (1) is opened and the heater (9) is disconnected from the digester (1) by closing the valve (10), while the liquor is caused to circulate within the digester during the digestion period. At the same time the heater (9) is connected with the digester (2), which has been charged with wood chips while the digester (1) was being heated. Einar Morterud, Torderoed pr. Moss, Norway. German Patent No. 573,084.

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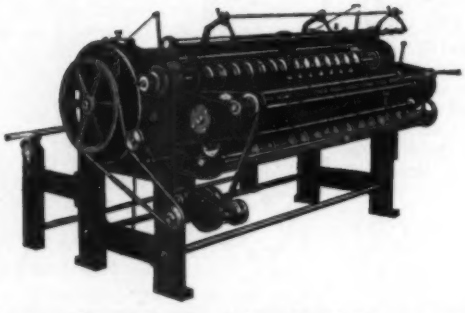

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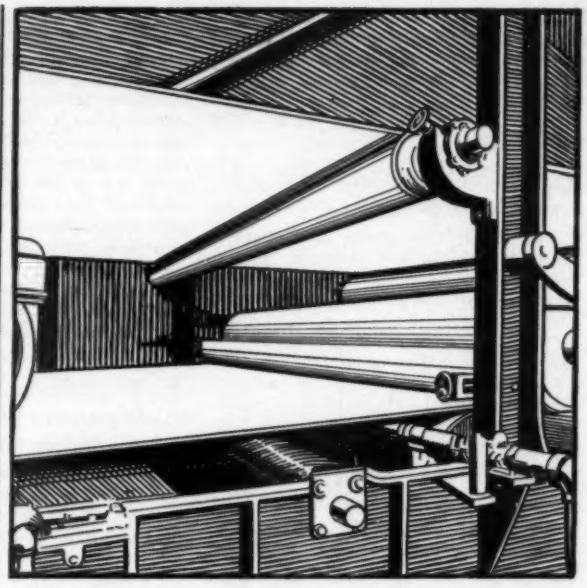

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The COMMERCIAL OUTLOOK

New York, July 1, 1933.

ADDITIONAL improvement of an appreciable character has been scored in industry and trade, and, after lagging behind for a time following the upturn in general business, it can be stated that the paper industry now is feeling the effects of the marked pick-up in most lines of manufacturing and commerce. On all sides are signs of a much better situation in the paper market, of demand expanding to a considerable degree and in a healthy manner, of actual consumption of practically all kinds of paper mounting, and of manufacturers finding it necessary to step up production to take care of the increased number and volume of orders being received.

That prospects are favorable is agreed to by nearly all within the paper industry. Increasing employment, expanding demand for various commodities, broadening wholesale and retail movement of merchandise, a gradually mounting buying power, and back of all this a more confident sentiment, are developments which seem certain to lead to continued improvement in business, and, of course, paper manufacturers and distributors expect their industry to share in the "come-back" of business to its full proportion. Figures show that already some 1,500,000 men have returned to work, and predictions are that the operation of the new National Industrial Recovery Act will put fully 3,000,000 additional people back in jobs by September. This, after all, will be the basic factor in a revival of business to more normal levels, and the Government in Washington appears determined to concentrate its efforts toward rehabilitating industry in this one direction—that of creating work for the thousands of men and women who have sought employment for some months and have been unable to find it.

The functioning of the Recovery Act is expected to aid the revival of business materially. A large majority in the paper industry think highly of this newest effort of the Roosevelt Administration to improve economic and business conditions; in fact, paper manufacturers and other groups within the industry are solidly behind the Government in this move and are at present preparing their respective codes of fair competition, etc., to be submitted to the administrator of the new law.

Another very favorable indication of what the future seems to hold in store for general business is to be seen in the sharp rise in commodity prices, more particularly farm products. Dollar wheat has returned, cotton has sold up to close to 10.50 cents a pound, corn is back to a 50-cent level, and other products of the farm have registered advances in like proportion. It does not require any imagination to perceive that this will lead to a broad increase in buying power among farmers; in fact, economists and others in a position to know point to this as sure to prove a major adjunct in the improvement in business conditions expected in the months to come. The raising of the wage level in manufacturing industries, which will be effected by the Recovery Act, also will be an important factor in this connection.

One of the problems paper manufacturers have had to contend with recently has been that of discouraging, while at the same time not disgruntling, paper jobbers from buying too heavily for stocking up purposes. When it became practically a certainty a few weeks ago that paper prices were due to rise, in conjunction with the upward move in commodity prices generally, jobbers the country over stepped in and began to buy on a large scale, aiming, of course, to fill their stock shelves with paper purchased at the low prices then prevailing. Manufacturers soon discovered that, unless they took care to avoid such an outcome, they would find themselves loaded up with orders at low prices; in short, "holding the bag" for their jobber and dealer customers. To put a check on this trend in buying, paper mills in various parts of the country and producing just about every kind of paper issued notices to the effect they would not accept orders for other than prompt shipment unless the matter of price was left open until time of delivery when the price to be paid would be the market quotation then obtaining. Obviously, it was necessary for manufacturers to take such steps because raw materials were increasing in cost sharply, and manufacturers were at a loss to figure what their costs would be even for a brief period ahead. Unquestionably, this has held paper buying in check, not alone by jobbers but also by consumers, but it has been creative of a healthier tone to demand.

Price advances in some classes of paper and board have been substantial. Some lines of fine paper have been boosted 10 per cent, and the tendency remains in an upward course. Book paper mills are endeavoring to secure at least a $5 per ton rise in sales of uncoated book papers, while advances of this extent are firmly quoted on coated book papers. Wrapping paper has strengthened fully a quarter of a cent per pound, and some manufacturers are reported quoting at a half-cent rise. Tissue, parchment, fancy and specialty papers are nearly all priced above recently prevailing levels; late reports are to the effect that even newsprint manufacturers are contemplating a jump in quotations on their product. In fact, the feeling is common within the trade that a revision of at least $5 a ton will soon be made in the contract basis on standard newsprint. Boxboard prices have moved up considerably; in the East $42.50 a ton is quoted on filled newsboard and $40 on plain chipboard, constituting increases of $12.50 to $15 a ton over the market levels ruling only a few weeks ago. The tendency in prices throughout the market is strongly forward, and additional advances appear to be a certainty.

Production of newsprint in the United States during May amounted to 79,516 net tons, against 74,507 tons in the preceding month and 88,087 tons in May last year, according to the News Print Service Bureau. Canadian production was 171,776 tons in May, compared with 147,759 tons in April this year and 175,887 tons in May a year ago. Shipments from mills in both countries were somewhat smaller than current production, totaling 77,196 tons in May from United States mills, contrasted with 76,095 tons in April and 88,525 tons in May, 1932, and 165,520 tons from Canadian mills, against 161,266 tons in the preceding month and 172,574 tons in May 1932.

During the first five months of 1933 production of newsprint in the United States totaled 372,118 tons, against 460,671 tons in the same period of 1932 and 492,646 tons in 1931, while Canadian output reached 722,762 tons, compared with 842,743 tons a year ago in the corresponding time and 953,302 tons in 1931. Production in both countries was 1,094,880 tons, against 1,303,414 tons last year and 1,445,946 tons in 1931. Stocks of newsprint at United States mills at the end of May were 23,560 tons, contrasted with 21,177 tons a month before and 36,156 tons on the same date a year ago, while stocks at Canadian mills amounted to 43,428 tons, against 37,332 tons a month previously and 57,014 tons last year.

❖ ❖ ❖

◆ Painting Walls With Paper

Announcement of a new type of wall paper introduced on the German market and known as liquid wall paper has been given out by the Bureau of Foreign and Domestic Commerce. This product is used in place of the usual relatively expensive paper or wall paint and is reported to last much longer than any of them.

Loose and unbound paper fibers are used for this purpose, being delivered in the form of a thick paste and thinned, for applying on walls, with ordinary glue paints. All kinds of colors and shades are obtainable, while various designs are also possible. This new wall cover is reported to be very elastic and durable after drying. Also, it does not peel off.

Domestic RAW MATERIALS

◆ Papermaking Rags

Further sharp advances have been scored by prices of most descriptions of papermaking rags. The upturn in the market which was well under way early in May and which for a time involved in the main certain grades has meanwhile affected practically all grades, and market levels of new cotton and linen cuttings, old white and blue cottons, roofing stock and other sorts of rags have moved upward to where the rise in some instances has been nothing short of sensational.

Again it should be stated that the forward march of prices has not been due to anticipation of broader demand from consuming mills, as perhaps has been the case in some raw materials. The advance in rag values has been promoted and supported by substantial purchasing by paper manufacturers, together with a supply condition which as regards some grades has been strong indeed. Probably in no other class of rags for paper making has this been more clearly observed than in roofing stock. These, the lowest and cheapest grades of rags, are not stocked by packers and dealers, and during the lengthy period of subnormally low prices no doubt appreciable quantities were permitted to be destroyed. Thus, when prices began to rise and roofing paper mills came in to buy, the market advanced quickly owing to the tight supply situation, and as prices continued to jump, consumers extended their efforts to acquire the rags desired, thereby lending additional strength to the market.

Comparing prices now prevailing with those of only a couple of months ago, roofing rags have advanced almost 200 per cent. Sales of No. 1 roofing stock have been recorded in the East at 1.10 cents per pound f. o. b. dealers' shipping points, and of No. 2 packing at 95 cents per hundred pounds. It is highly likely that some exceptional transactions have been in excess of these prices; in fact, it is a certainty that imported roofing rags have brought above these values.

Market levels of new cotton cuttings are still difficult to ascertain with accuracy. It appears that writing paper manufacturers in most instances have kept as much out of evidence as buyers as their requirements have allowed; moreover, most of the purchases made have been of an "under-cover" variety. Nevertheless this has not prevented dealers from raising prices sharply. Whether sellers are securing the prices asked is another question, but it can be said they are not pressing to sell and from all indications are insisting on the figures wanted. No. 1 new white shirt cuttings have been definitely sold to consuming mills at 5.50 cents a pound f. o. b. dealers' shipping points, and a majority of dealers are now quoting beyond this basis, usually asking 5.75 to 6 cents. New soft unbleached muslin cuttings are held at 6.50 cents or higher at shipping points, light silesias at 4.50 cents, fancy shirt cuttings at 2.50 cents, No. 1 washables at 2 cents, new blue overall cuttings at 4.25 cents, new canvas cuttings at 5.25 cents, bathrobe cuttings at 2.25 cents, black silesias at 2.75 cents, new white linen cuttings at 8.75 cents and grey linen at 7.50 cents.

Repacked thirds and blues are quoted by dealers at approximately 1.50 cents per pound at points of shipment, twos and blues at 1.75 cents, No. 1 repacked white rags at 3 cents upward and No. 2 whites at around 2.25 cents.

◆ Old Paper

Additional broad gains in prices have marked recent transactions in old paper stock, certain grades of which—notably No. 1 mixed paper—have risen no less than 250 per cent from the low point of several months ago. The New York market has led the way in the advance, and dealers in other parts of the country have jacked up prices in like proportion to the rise in the East. No. 1 mixed paper is selling in New York at 75 cents per hundred pounds f. o. b. that city, contrasted to a price level of 20 cents less than three months ago. Folded news has moved up in price to 80 cents per hundred pounds, old books and magazines are selling at a cent per pound for No. 1 heavy flat stock, No. 1 old kraft at 1.20 cents a pound, and white ledger stock at 1.00 to 1.05 cents per pound. Prices of shavings have kept pace with the increase in other grades, and sales of No. 1 soft white shavings have been recorded in excess of 2 cents a pound at shipping points, of one-cut soft white at 2.40 cents, of No. 1 hard white shavings at 2.25 cents, and of No. 1 hard white envelope cuttings at higher than 2.50 cents.

◆ Pulpwood

Pulpwood prices are moving upward under a steady to fairly brisk demand from consumers and conditions affecting the cutting of wood which threaten to lead to a serious shortage. Cutters in some Canadian regions have gone on strike, and producers as a result have cancelled contracts with United States buyers and closed their camps. The strike began when the men demanded $3 a cord for cutting pulpwood and contractors refused to offer more than $2.75.

◆ Rope and Bagging

Market values of old rope and bagging have climbed to new high levels, and are now well above the highest points known in several years. At one swoop the leading paper mill purchasing agency recently advanced prices on old manila rope a cent per pound or $20 a ton to a basis of 2.50 cents a pound f. o. b. dealers' shipping points for No. 1 domestic old manila and 2.25 cents ex dock American Atlantic ports for No. 1 foreign old manila rope. It is probable that independent consuming mills have in some instances paid beyond these prices for old rope. No. 1 scrap bagging is up to about 1.10 cents a pound at shipping points, while old No. 1 gunny bagging is selling at an average of 1.25 cents per pound, and roofing bagging at 85 to 90 cents a hundred pounds. The likelihood is some papermakers have paid even higher for bagging, as the market is strong and offerings by dealers and importers none too ample.

◆ Mechanical Pulp

A rising trend is noted in the mechanical pulp market and prices have scored some advance. Demand is reported fairly active; at any rate, consumers are buying in a volume sufficient to absorb the great bulk of supply offered by manufacturers, while the latter are averse to selling far ahead, evidently anticipating higher prices. Domestic groundwood is around $23 a ton f.o.b. pulp mills, prices depending on the air dry test and the haul to consuming centers, while grinders in Canada are mostly demanding in the vicinity of $17 or $18 a ton f.o.b. grinding plants or a basis of about $22 ex dock American Atlantic ports.

◆ Chemical Pump

The uptrend in imported wood pulp prices is reflected in domestic chemical pulps, which have risen in about the same proportion as the foreign product and in some instances to a broader degree. The tone of chemical pulp prices is exceedingly firm. Not only have consumers evinced a good deal more buying interest as well as increasing their commitments but producers have been rather reluctant to sell, particularly for forward shipment. Pulpmakers as a general thing are willing to accept orders ahead but only with the provision that price be left open to be-determined at the time deliveries are made. One of the foremost domestic producers of bleached sulphite is now quoting a minimum of 3 cents a pound f.o.b. pulp mill for such pulp of prime quality, while some grades of bleached sulphite for bond paper purposes are quoted at well above this level though book paper grades are available at down around 2.50 cents. Unbleached sulphite is quoted from 1.65 to 2 cents at pulp mills, according to quality. Bleached soda pulp is fully $5 a ton higher at 2.25 cents upwards delivered book paper mills, while domestic kraft is 1.50 to 1.75 cents f.o.b. producing mills for No. 1 eastern kraft.

◆ Chemicals

Firmness marks both domestic and foreign casein, with higher prices prevailing. The domestic coarse ground is quoted 12 to 12.50 cents a pound, and the fine mesh 12.50 to 13 cents. Argentine casein is to be had at 11.50 to 12 cents. Other papermaking chemicals are firm and on the uptrend quotably.

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

The expected has happened in wood pulp prices. Gyrations of a roller coaster variety, yet over the period showing a steady rise against the dollar, in European exchanges, coupled with a revival of demand following a lull in buying by American consumers, have caused prices of pulp to register an appreciable advance. The increase in market levels has been very moderate in comparison to that witnessed in most other commodities, but prices of all classes of chemical pulp of foreign origin have advanced fully $5 per ton, and appear likely to go higher.

Wood pulp was one of the last commodities to start to climb in price. Producers in Scandinavia and elsewhere in Europe maintained prices for a considerable time after other markets had advanced, seeming satisfied with the prices which had been agreed upon for sulphite and kraft pulp and established in sales to United States consumers. However, the steady rise in exchanges ultimately reached a point where a revision in pulp prices in an upward direction became more or less a necessity, from the European pulp seller's viewpoint, and after holding several conferences for discussion of the subject quotations to America were boosted $5 a ton on bleached and unbleached sulphite and on kraft pulp. Prices now ruling as market levels are 2.25 to 2.35 cents per pound ex dock New York or other American Atlantic ports on prime bleached sulphite, 1.75 to 1.85 cents on prime strong unbleached sulphite, and 1.50 cents on prime standard Swedish kraft pulp.

Meanwhile, the currency situation has attained lengths where producers in Europe are in numerous instances reluctant to sell even at these advanced levels, and of late offerings not only have been noticeably restricted but a good many mills in Scandinavia have held off making sales while apparently waiting further developments or a settling of exchanges on something resembling a stable basis. Within the past few weeks, paper and board manufacturers in the United States have stepped in and bought pulp abroad on a fairly large scale. Realizing that prices were going against them, and likely to register additional advances, consumers placed orders for sizable tonnages for prompt shipment and for delivery some time hence. More recently, however, demand has simmered off, partly because buyers have grown somewhat confused, if not disgruntled, over the price condition, the limited offerings from primary sources abroad and uncertainty concerning their forward requirements. The market at present is therefore quieter, yet with pronounced firmness.

Some producing mills in Europe are said to be practically sold out for the remainder of this year, and are inclined to ignore inquiries from consumers. Others are so well sold up that they are satisfied to hold off disposing of the balance of their production they have to market while anticipating prices in their favor. About the bottom price named on prime bleached sulphite is 2.25 cents ex dock American Atlantic seaboard, and some brands of bleached are quoted well above this level. Prime strong unbleached sulphite is scarcely available under 1.75 cents ex dock, though half-prime grades are 1.60 to 1.65 cents. Kraft is very firmly quoted at 1.50 cents, at which price some sizable contracts are said to have been closed. Scandinavian groundwood is around $24 per short ton for dry pulp ex dock American Atlantic ports.

Imports of pulp into the United States dropped off sharply during April to a total of 55,722 long tons of chemical grades, valued at $2,097,085, compared with 70,467 tons of a value of $2,657,488 in the preceding month, and 87,891 tons of a value of $3,091,882 in February last, according to U. S. Department of Commerce figures. Groundwood imports in April amounted to 7,097 long tons of a declared value of $131,296, against 8,093 tons of a value of $132,517 in the month before. Chemical pulp imports during the first four months of this year aggregated 338,161 long tons, valued at $11,953,513, contrasted with 476,743 tons of a value of $18,557,169 in the corresponding time of 1932, while mechanical pulp receipts totaled 27,515 long tons of a value of $484,900, against 55,737 tons of a value of $1,154,743 in the same period last year.

◆ Paper Stock

Papermaking rag imports into the United States in April last amounted to 4,373,351 pounds, valued at $26,344, according to official U. S. Department of Commerce statistics, showing an increase over the 3,613,363 pounds of a value of $23,879 in the preceding month, but a decline from the 11,372,982 pounds of a value of $123,086 imported in April, 1932. Imports during the first four months of this year reached a total of 17,645,049 pounds, valued at $137,823, against 34,439,058 pounds of a value of $441,692 in the similar period of 1932. Imports of miscellaneous paper stock in April were 5,317,500 pounds, valued at $53,602, making a total of 21,672,090 pounds of a value of $210,451 in the first four months of the year, contrasted with $35,916,994 pounds of a value of $290,260 in the same period last year.

◆ Paper

Importations of paper into the United States during April continued to show a gain in value over the preceding month, amounting to a total of $5,867,650, contrasted with $5,235,529 in the preceding month, according to U. S. Department of Commerce statistics. During the first four months of the current year imports were valued at $21,326,229, compared with $33,217,133 in the same time of 1932, and $42,535,124 in the first four months of 1931. Standard newsprint of a value of $5,384,716 comprised the great bulk of paper imports in April last, with cigarette paper of a value of $162,917 the next item of importance.

EXPORTS

Exports of paper and paper products from the United States during April were somewhat smaller in value than in the preceding month. According to official figures compiled by the U. S. Department of Commerce, exports in April totaled in value $1,052,357, compared with shipments of a value of $1,193,415 in March, and $1,464,793 in April, 1932. Paper exports from this country this year are running substantially behind those of last year, the total for the first four months of 1933 reaching a value of $4,308,830, contrasted with $5,726,737 in the corresponding period a year ago.

Newsprint exports during April amounted to 955,458 pounds of a declared value of $22,026, against 5,079,966 pounds of a value of $72,157 exported in the preceding month. Uncoated book paper shipments were 950,669 pounds of a value of $48,834 in April, contrasted with 2,020,089 pounds of a value of $96,025 in the month before, while wrapping paper shipments during April were valued at $103,964, against $125,098 in the preceding month, and writing paper exports were valued at $58,704, against $83,254. Tissue and crepe paper exports reached a value of $47,336 in April, contrasted with $23,089 in the month preceding, and building and sheathing paper exports were of a value of $8,935, against $7,403 in March. Boxboard exports were valued at $56,266 in April, against $37,454 in the preceding month, while other paperboard shipments were valued at $36,025, compared with $52,039. Exports of paper bags were of a value of $39,027 in April, against 41,820 in March, while paper box and carton shipments reached a value of $33,871, compared with $40,354.

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